ust for your
Tandy Color
omputer 1, 2 and 3

November 1986

Canada $4.95 U.S. $3.95

The RAINBOW®

THE COLOR COMPUTER MONTHLY MAGAZINE

Ma Belle Amie

The Beauty of Telecommunications

Add an editor and graphics screens to CoBBS

Connect a second CoCo to your BBS setup

Ham it up with packet radio

Access your CoCo by remote

Play checkers over a modem

Radio Shack

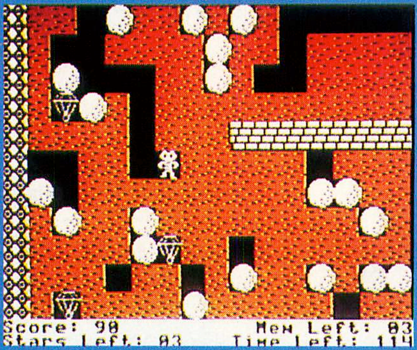
Also,

A terminal program for the CoCo 3

And Doctor ASCII Joins the Rainbow

DIECOM PRODUCTS

BOUNCING BOULDERS

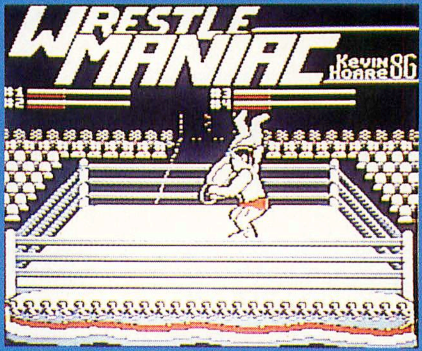

Score: 90
Men Left: 03
Stars Left: 03
Time Left: 114

Bouncing Boulders is a new, fast paced arcade-style game for your Coco. As you race your man around the screen you try to collect enough stars to open the exit to the next level. You can drop rocks to kill aliens that follow you around the screen trying to catch you. But beware of the falling and bouncing boulders as they will crush your man if you get trapped under one. The many different screens with lots of puzzles will keep you playing for hours on end.

64 K REQUIRED
TAPE OR DISK

$28.95 U.S.
$38.95 CAN.

WRESTLE MANIAC

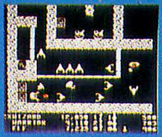

WRESTLE MANIAC
Kevin Hoare 86

You've asked for it and now it's here, a wrestling game for your color computer. Play a single match or play a tag team match in this 1 to 4 player game. Wrestle against the computer or wrestle against your friend in a single or tag team match. Use punches, kicks, body slams, back breakers and many other moves as you attempt to pin your opponent. Super graphics and realistic play action make this a great game for all.

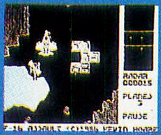
64 K AND JOYSTICK
REQUIRED
TAPE OR DISK

$28.95 U.S.
$38.95 CAN.

GANTELET

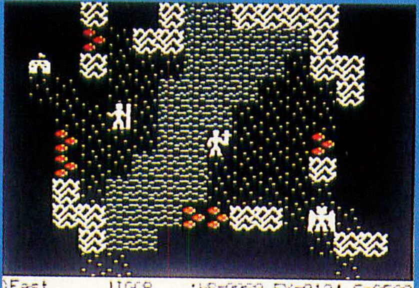


MISSION F-16 ASSAULT


RADAR
000015
PLANES
3
PAUSE
F-16 ASSAULT (C)1986 KEVIN HOARE

MARBLE MAZE

THE GATES OF DELIRIUM


East
North
West
IGOR :HP=0089,EX=0124,G=0500
THOR :HP=0248,EX=0110,G=0840
WANDA :HP=0229,EX=0003,G=0100
ZANZIBAR:HP=0119,EX=0003,G=0240

Travel through towns and explore strange lands in the ultimate fantasy role-playing game for the color computer. As you travel the land you will meet different characters that you may convince to join you in your quest. During your quest you will learn the secrets of magic spells and ultimately, your final goal.

Enter The Gates of Delirium contest! The first person to solve the game shall be our grand prize winner of a Coco 3. There will be 5 second prizes of one free game from Diecom Products and 5 third prizes of one free hat from Diecom Products.

64K
REQUIRED **$38.95** U.S.
$52.95 CAN.

AVAILABLE ON DISK ONLY

ALSO AVAILABLE
— Paper Route, Knock Out, Karate, each game requiring 64K. Tape or disk.
$28.95 U.S.
$38.95 CAN.

DIECOM PRODUCTS

6715 FIFTH LINE, MILTON, ONT., CANADA L9T 2X8

We accept:
VISA
MasterCard
cheque or money order

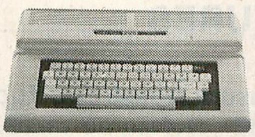
24 hr. order line:
(416) 878-8358
personal service 9-5

Please add $2 for shipping & handling. Ontario residents add 7% sales tax.
C.O.D. Canada only.
Dealer inquiries invited
Looking for new software.

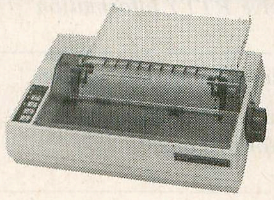
From Computer Plus to YOU . . .

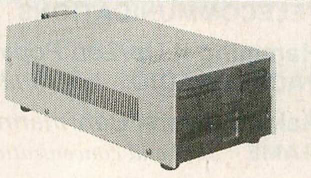
PLUS after PLUS after PLUS

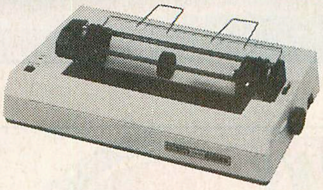
Tandy 200 24K $510*
Tandy 600 32K $810*
Tandy 102 24K $339*


Color Computer 3
w/128K Ext. Basic $169

Tandy 1000 EX $569.00
Tandy 1000 SX $839.00


DMP-130 $219*


Color Computer Disk Drive
Drive 0 $179*Drive 1 $149*


DMP-105 $110*

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS

Tandy 1000 EX 1 Drive 256K	569.00
Tandy 1000 SX 2 Drive 384K	839.00
Tandy 3000 HL 1 Drive 512K	1229.00
Model IVD 64K with Deskmate	889.00

PRINTERS

Radio Shack DMP-105 80 CPS	**110.00***
Radio Shack DMP-130 100 CPS	**219.00***
Radio Shack DMP-430 180 CPS	559.00
Radio Shack DWP-230 Daisy Wheel	359.00
Star LV-1210 120 CPS	199.00
Star NX-10 120 CPS	279.00
Star SG-15 120 CPS	410.00
Panasonic P-1091 120 CPS	259.00
Panasonic P-1092 180 CPS	339.00
Okidata 292 200 CPS	529.00
Okidata 192+ 200 CPS	375.00
Epson LX-80 100 CPS	275.00
Epson FX-85 160 CPS	419.00

MODEMS

Radio Shack DCM-7 Modem	85.00
Radio Shack DC Modem Program Pac	99.00
Radio Shack DC Modem 212	179.00
Hayes 300 Baud Modem	169.00

COLOR COMPUTER MISC.

Radio Shack Drive Controller	99.00
Extended Basic Rom Kit	39.95
64K Ram Upgrade Kit	39.00
Radio Shack Deluxe Keyboard Kit	24.95
HJL Keyboard Upgrade Kit	79.95
COCO Max Y Cable	27.95
Color Computer Mouse	44.00
Multi Pack Interface	89.00
Botek Serial to Parallel Conv.	69.95
Radio Shack CCR-81 Recorder	52.00
Radio Shack Deluxe Joystick	26.95
Amdek Video 300 Green Monitor	139.00
Amdek Video 300 Amber Monitor	149.00
Goldstar Green Monitor	85.00
Panasonic Amber Monitor w/audio	99.00
Radio Shack VM-4 Green Monitor	99.00
Mark Data Universal Video Driver	29.95

COLOR COMPUTER SOFTWARE

	TAPE	DISK
Approach Control Simul.	29.95	34.95
Worlds Of Flight	29.95	32.95
Mustang P-51 Flight Simul.	29.95	34.95
Spectral Typing Tutor	19.95	22.95
Dungeon Quest	24.95	27.95
Major Istar	24.95	27.95
Sam Sleuth Private Eye	24.95	27.95
Mark Data Graphic Adven.	24.95	27.95
COCO Util II by Mark Data		39.95
COCO Max by Colorware	69.95	
COCO Max II by Colorware		79.95
AutoTerm by PXE Computing	39.95	49.95
TelePatch II by Spectrum		29.95
TeleWriter 64	49.95	59.95
Deft Pascal Workbench		99.95
Deft Extra		39.95
Pro Color File Enhanced 2.0		59.95
Max Fonts (72 COCO Max Fonts)		64.95
Elite Calc	69.95	69.95
Elite Word	69.95	69.95
Elite File (disk only)		74.50
DynaCalc (disk only)		99.95
Word Pack RS by PBJ		99.00
VIP Writer (disk only)		69.95
VIP Integrated Library (disk)		149.95

Order any 2 software pieces listed and take 10% off their listed price. All Radio Shack software 10% off list. Send for complete list. *Sale prices through 11/30/86

CALL TOLL FREE
1-800-343-8124

- *LOWEST POSSIBLE PRICES*
- *BEST POSSIBLE WARRANTY*
- *KNOWLEDGEABLE SALES STAFF*
- *TIMELY DELIVERY*
- *SHOPPING CONVENIENCE*

VISA AMERICAN EXPRESS MasterCard

computer plus

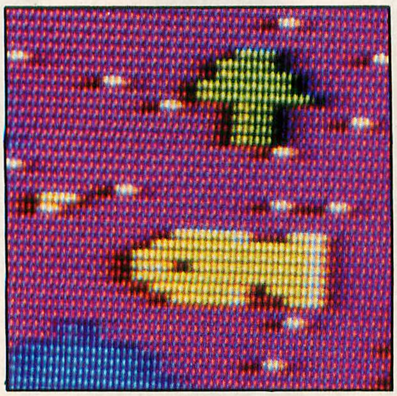
P.O. Box 1094
480 King Street
Littleton, MA 01460

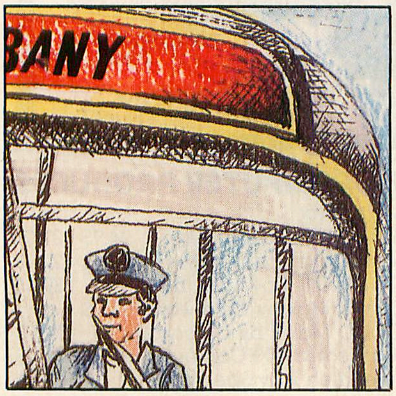
SINCE 1973

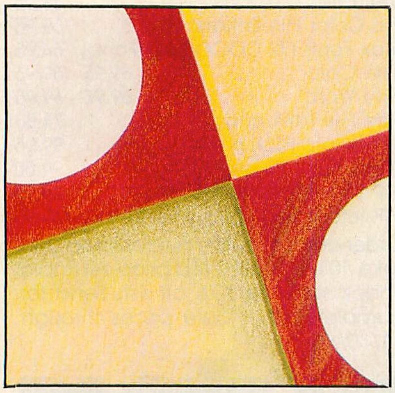
IN MASSACHUSETTS CALL (617) 486-3193

TRS-80 is a registered trademark of Tandy Corp.

Under The RAINBOW


28


42


114

FEATURES

Treasure Quest/*Eric Tucker* — 18
GAME *Feel this Adventure with spring-centered joysticks*

Thanksgiving Pizza Party/*Bill Bernico* — 28
ENTERTAINMENT *If the Pilgrims had met Italians instead*

Third One's the Charm/*Mark Siegel* — 30
TUTORIAL *New commands and features of the CoCo 3*

RTTY for the CoCo/*Marty Goodman* — 36
TELECOMMUNICATIONS *Send and receive RTTY information*

Hamming It Up/*Len Popyack* — 42
PACKET RADIO *Put worldwide communications in your "packet"*

Raiders/*Darrel Behrmann* — 52
GAME *Skill and concentration are needed for this one*

The Old-Time Fix/*Horace D. Vaughn* — 55
MODIFICATION *Use the Old-Time Banner Printer with disk*

The Evolving Remote/*Mark Crosby* — 70
TELECOMMUNICATIONS *Use* Remote2 *with an RS-232 Pak*

CoBBS Message Editor/*Richard Duncan* — 80
TELECOMMUNICATIONS *A useful update for the CoBBS system*

Two-CoCo BBS System/*Ted Kyte* — 86
TELECOMMUNICATIONS *A switching system for your BBS*

Coming to Terms/*Rick Adams and Dale Lear* — 93
COCO 3 CAPABILITIES *Faster telecommunications on the new CoCo*

The Artistic BBS/*Eric Bailey* — 108
GRAPHICS *Use Lo-Res graphics for sharp logon messages*

McCheckers/*Erik Gavriluk and Greg Miller* — 114
GAME *Checkers with a modem offers a new twist*

The Envelope Please/*Contest Judges* — 125
CROSSWORD CONTEST *Dick McGrath's tricky puzzle wins first place*

Keycad/Keyflow/*James Ventling* — 126
KEYBOARD UTILITY *CoCocad and CoCoflow modifications*

Speedy GETzales/*H. Allen Curtis* — 158
GRAPHICS *Vastly increase GET and PUT speeds*

The Super Switcher/*Robert C. Merryman* — 168
HARDWARE PROJECT *Easy access for your peripherals*

Living on Rainbow Time/*Greg L. Zumwalt* — 170
COCO 3 CAPABILITIES *Amazing graphics displays*

Cover illustration copyright © 1986
by Fred Crawford

The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ads on pages 172 and 159.

NEXT MONTH: Ho, ho, ho! It's that merry time of year and there's no better way to get into the festive spirit than with our December Holiday Issue. We've packed our bag full of surprises and programs you're sure to enjoy during those long winter evenings. And don't forget to take a look at our special Holiday Shopping Guide; perfect for selecting just the right gift for that certain CoCo nut.

Light up your December with THE RAINBOW, the number one information source for the Color Computers 1, 2 and 3!

COLUMNS

BASIC Training/*Joseph Kolar* 46
One character/space at a time

Building November's Rainbow/*Jim Reed* 16
Managing Editor's comments

CoCo Consultations/*Marty Goodman* 182
Just what the Dr. ordered

Delphi Bureau/*Cray Augsburg* 102
Using Mail in the SIG and Goodman's database report

Doctor ASCII/*Richard E. Esposito* 154
Introducing a new Rainbow column

Education Notes/*Steve Blyn* 74
Word fun: "The Three Bears" comes of age

Education Overview/*Michael Plog, Ph.D.* 166
The most important educators of all

PRINT#-2,/*Lawrence C. Falk* 12
Editor's notes

Turn of the Screw/*Tony DiStefano* 88
More on the new VDG

Wishing Well/*Fred B. Scerbo* 62
Prepare for Thanksgiving with Liquid Measure

RAINBOWTECH

Barden's Buffer/*William Barden, Jr.* 192
A CoCo assembly language quiz

Bits and Bytes of BASIC/*Richard White* 188
BASIC09 on the CoCo 3

Downloads/*Dan Downard* 186
Answers to your technical questions

KISSable OS-9/*Dale L. Puckett* 199
Blue sky for OS-9 Level II

Tutorial/*Calvin Dodge* 191
Readable Equivalents to C

DEPARTMENTS

Advertiser Index 208
Back Issue Information 119
CoCo Cat 169
CoCo Gallery 26
Corrections 78
Letters to Rainbow 6
The Pipeline 104
One-Liner Contest Information 151
Rainbow Info 15
Received & Certified 132
Reviewing Reviews 131
Submitting Material to Rainbow 25
Subscription Information 38
These Fine Stores 206

PRODUCT REVIEWS

Product Review Contents 129

The RAINBOW

November 1986 Vol. VI No. 4

Editor and Publisher Lawrence C. Falk

Managing Editor James E. Reed
Senior Editor T. Kevin Nickols
Submissions Editor Jutta Kapfhammer
Copy Editor Jo Anna Wittman Arnott
Reviews Editor Judi Hutchinson
Editorial Assistants Judy Brashear, Wendy Falk, Jody Gilbert, Angela Kapfhammer
Technical Editor Dan Downard
Technical Assistants Cray Augsburg, Chris Wehner
Contributing Editors William Barden, Jr., Steve Blyn, Tony DiStefano, Richard Esposito, Martin Goodman, M.D., Joseph Kolar, Michael Plog, Dale Puckett, Fred Scerbo, Richard White
Consulting Editors Ed Ellers, Danny Humphress, Belinda C. Kirby
Art Director Heidi Maxedon
Production Coordinator Cynthia L. Jett
Designers Tracey Jones, Sandra Underwood, Denise Webb

Chief of Typography Debbie Hartley
Typography Services Jody Doyle, Suzanne Benish Kurowsky

Falsoft, Inc.
President Lawrence C. Falk

General Manager Patricia H. Hirsch
Asst. General Mgr. for Finance Donna Shuck
Admin. Asst. to the Publisher Sue E. Rodgers

Editorial Director James E. Reed
Asst. Editorial Director Jutta Kapfhammer
Creative Director Heidi Maxedon

Chief Bookkeeper Diane Moore
Advertising Accounts Beverly Taylor
Dealer Accounts Judy Quashnock
Fulfillment Services Director Bonnie Frowenfeld
Fulfillment Services Asst. Dir. Sandy Apple
Asst. Customer Service Mgr. Beverly Bearden
Word Processor Manager Patricia Eaton
Development Coordinator Ira Barsky
Chief of Printing Services Melba Smith
Pre-press Production John Pike
Dispatch Janice Eastburn
Asst. Dispatch Mark Herndon
Business Assistants Laurie Falk, Sharon Smith, Monica Wheat, Pam Workhoven

Advertising Coordinator Doris Taylor
Advertising Representative Kim Vincent
Advertising Assistant Debbie Baxter
(502) 228-4492

West Coast Advertising and Marketing Office
Director Cindy J. Shackleford
Advertising Representative Shirley Duranseau
For RAINBOW Advertising and Marketing Office Information, see Page 208

THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. **THE RAINBOW**, **RAINBOWfest** and **THE RAINBOW** and **RAINBOWfest** logotypes are registered ® trademarks of FALSOFT, Inc. • Second class postage paid Prospect, KY and additional offices. USPS N. 705-050 (ISSN No. 0746-4797). POSTMASTER: Send address changes to **THE RAINBOW**, P.O. Box 385, Prospect, KY 40059. Forwarding Postage Guaranteed. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada. • Entire contents copyright © by FALSOFT, Inc., 1986. **THE RAINBOW** is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. • Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered ® trademarks of the Tandy Corp. • Subscriptions to **THE RAINBOW** are $31 per year in the United States. Canadian rates are U.S. $38. Surface mail to other countries is U.S. $68, air mail U.S. $103. All subscriptions begin with next available issue. • Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. No refund after mailing of three or more magazines.

LETTERS TO THE RAINBOW

Friends for a Long Time to Come

Editor:

I received the September 1986 issue of THE RAINBOW and was excited to see the announcement of the new CoCo 3. I immediately ran down to the local Radio Shack Computer Center to see this new machine and they didn't even have them in yet! I am amazed at how quickly you got this information into your magazine. That shows true dedication to your readers.

I am also amazed at the new CoCo and the features offered at such a low price. I was getting frustrated with having a great computer with only 64K of memory, and envious of my friends who have computers with larger memories, but now I will be the envy of them. It looks like CoCo and the great people of RAINBOW magazine will be my friends for a long time to come.

John Merrill
Provo, UT

BACK TALK

Editor:

I am writing in reference to Richard White's article "Getting In Touch With Penpal" [August 1986, Page 194]. Richard mentioned his dilemma when using JDOS 40-command track formatted disks with *Penpal.* His first reference is that the FREE command only returned 73 granules versus 78. This is because *Penpal* is not compatible with JDOS 40-track FAT table formats. *Penpal* follows the standard FAT table format established in Disk Extended BASIC with extensions for 40-track.

This format is based on the file allocation table containing 78 contiguous bytes of information concerning the availability of storage granules. This table starts with the first byte of the sector in which the file allocation table is stored. JDOS starts its first allocation byte on the sixth byte, followed by 77 additional bytes.

The first five bytes in the JDOS file allocation table are identification bytes. This code tells the JDOS operating system that a format other than 35-track, single-sided disk is installed. Since the file allocation table under Disk BASIC is byte-to-granule position dependent, this causes total incompatibility with JDOS 40-track disks outside of the JDOS operating environment. When *Penpal* checks the FREE status of the disk, it sees the first five bytes (of JDOS code) as used granules and the next 73 granules as the only FREE space available.

What *Penpal*, or any other Disk BASIC-based program, sees as data stored in granule 20 for example is seen by JDOS as data stored in granule 15. So a copy of a file saved under JDOS causes data from the wrong granule or granules to be moved to the new disk. You end up with garbage or missing data.

I recommend using only Disk BASIC compatible operating systems when using 40 tracks. A DOS like ADOS follows the FAT table format and just extends its range. The use of JDOS creates a need to stay with programs that are only JDOS compatible, or to operate with two operating systems and separate your disks by DOS type. It's too bad JDOS didn't put its ID Codes at the end of the file allocation table.

In reference to Richard's lost 14 granules under Disk BASIC, it is that you have 19 used granules plus JDOS code of 5 granules for a new used granule total of 24 verses 19 actually. This total would be from the 68 only reported by Disk BASIC.

In closing, may I say I really enjoy your magazine and its informative articles.

James Bodily
Clearfield, UT

Editor:

I appreciate the time and effort that Mr. Bodily has gone to, to explain why *Penpal* cannot use 40-track disks formatted under JDOS. This problem should not be considered a problem with *Penpal.* Rather, it is a compatibility problem between Disk BASIC and JDOS.

Mr. Bodily's closing comment about his appreciation of RAINBOW and its informative articles could not have been made but for material submitted by informed readers like Mr. Bodily who spend time to share their knowledge with others.

Richard White
Fairfield, OH

Metronomic Proportions

Editor:

I'd like to contribute this routine to Michael Bridges of Nashville, Tenn. [August 1986, Page 8], and anyone else who is interested in using the CoCo as a metronome. If you don't find certain speeds accurate enough, change the value of the variable 'T' in program Line 1 or merely enter a speed value greater than or less than the one you want. It will be more accurate if you type everything exactly as it is printed, including line numbers and spaces.

After you have typed it in, `RUN`. When the prompt appears, type a number for the speed you want in beats per minute and press ENTER. Your CoCo will immediately begin to act like a metronome. Make sure the volume is turned up on your TV or monitor. When you're finished, press BREAK.

```
0 CLS:CLEAR 200
1 T = 420
2 PLAY "05;L255;V31"
3 PRINT @ 225,;:INPUT "<enter>
METRONOME SPEED.";S
4 B = INT(60/S * T)
5 PLAY "G":FOR X = 1 TO B:NEXT
X:GOTO 5
```

Don Lockwood
Washington, PA

Pin-to-Pin Fix

Editor:

Alfred Johnson [July 1986, Page 8] wrote about the Cannon Typestar 7 that doubles as a typewriter. I own a Brother EP-44 dot-matrix printer that also doubles as a typewriter. It's portable, runs on AC or DC and has a 4K memory to use as a simple word processor.

The EP-44 has a built-in RS-232C interface. All you need to make the EP-44 work with CoCo is a 4-pin to 25-pin serial cable (Cat. No. 26-3014) from Radio Shack.

The following hookup works: CoCo Pin 2 to RS-232C Pin 20. CoCo Pin 3 to RS-232C Pin 1. CoCo Pin 4 to RS-232C Pin 3.

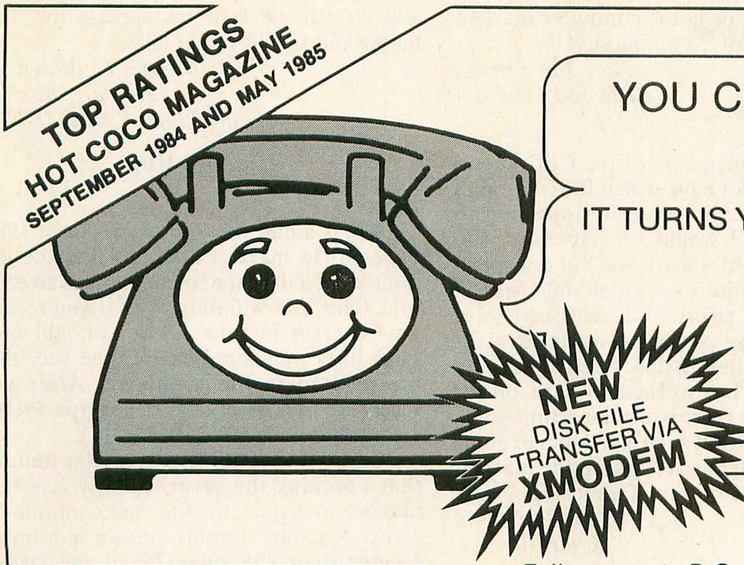
The EP-44 accepts ASCII code and is compatible with other computers, including Tandy models. Just set the Baud rate and word length, and you're ready to print. If anyone needs more information or has any questions, drop me a line.

Edward Lasota
720 E. 1st Avenue
Roselle, NJ 07203

Quick 'n' Dirty

Editor:

In response to E.C. Blend, Jr. [September 1986, Page 6] and others who have asked how to get *DeskMate* to print at 2400 Baud, here is a quick and dirty solution: Patch the



YOU COULD FALL IN LOVE WITH

AUTOTERM!

IT TURNS YOUR COLOR COMPUTER INTO THE

WORLD'S SMARTEST TERMINAL

AND MOST LOVABLE

GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 45,000 characters (33,300 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

XMODEM for disk file transfer.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

NO OTHER COMPUTER IN THE WORLD CAN MATCH YOUR COCO'S AUTOMATIC TERMINAL CAPABILITIES!!!

WHAT THE REVIEWERS SAY

"AUTOTERM is the Best of Class."
Graham, *RAINBOW*, 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."
Banta, *HOT CoCo*, 9/84

"Almost a full featured word processor..."
Ellers, *RAINBOW*, 11/84

"AUTOTERM's excellent error-handling routines, thorough documentation, and logical, easy-to-use command structure make it stand out."
Parker, *HOT CoCo*, 5/85

AVAILABLE IN CANADA
from
Kelly Software Distributors
Edmonton, Alberta

CASSETTE $39.95
DISKETTE $49.95
Add $3 shipping and handling
MC/VISA/C.O.D.

PXE Computing
11 Vicksburg Lane
Richardson, Texas 75080
214/699-7273

Please hire the mentally retarded. They are sincere, hard working and appreciative. *Thanks!* *Phyllis.*

device driver (printer) so that it ignores the Baud parameter in the descriptor and sends at 2400 Baud. This works for any application that uses the printer module.

Boot up with a disk that has *DeskMate*. If the disk does not have *Cobbler* and *Debug* in the execution directory, switch to one that does and execute `chx /do/cmds`, then load *Cobbler* and *Debug*. Switch back to the *DeskMate* disk and execute `chx /do/cmds` again. Patch the Printer module and execute *Cobbler* as shown below.

```
OS9:Debug
Interactive Debugger
DB: L PRINTER
    0000 87
DB: . .+61
    0061 A6
DB: =86
    0062 A8
DB: =04
    0063 35
DB: =12
      0064 xx
DB: L PRINTER
    0000 87
DB: . . +194
    0194 AE
DB: =9B
    0195 B2
DB: =25
    0196 CA.
DB: =35
    0197 xx
DB: Q
OS9:COBBLER /DO
```

The memory locations shown are offsets. The actual locations will be the offsets added to the base address where Printer is loaded.

Duane M. Perkins
Mount Gretna, PA

More Views on Pirating

Editor:

Mr. Vergona's letter [August 1986, Page 6] helps to emphasize that there are real people out there whose rights are being trampled on and their profits stolen by others who steal their software.

For those who think it is "no big deal" to copy software you haven't paid for, just what do you think is the difference between what you do and what a shoplifter does? Of course, the only difference between you and the shoplifter is that he will eventually be caught and punished, but you know you never will because it is impossible for anyone to enforce the copyright laws. You operate outside the sphere of law enforcement, so society gives you the romantic label of pirate instead of thief . . .

Robert Pels
Burlington, VT

Editor:

. . . I sympathize with his plight. Having spent over a year writing and rewriting a BASIC checkbook management program, I would hate to see the results of my labors passed around illegally if I were offering the program for sale.

I do not condone "trading" programs with other users — in the end this will only hurt the recreational or home computer market, especially the CoCo community! . . .

Jim Peasley
Redwood City, CA

Editor:

Responsible members of the CoCo community would not have stolen Bill Vergona's work so there is no sense in appealing to those who did. I would suggest those who have a copy of Bill's work and did not spend any money to acquire such material, owe Bill Vergona for his efforts. Bill said the loss of revenue from this piracy has made advertising his product impossible. I don't currently need what Bill has worked so hard on for my own use, but there will come a time when I may very well want such a product or some new product Bill has brought to the marketplace. I want the option of choosing. . . .

David Nolton
Charlotte, NC

Editor:

. . .I agree totally with his point of view; however, I don't see how sales could have been cut "by over 50 percent." Any serious user needing such a powerful utility as *CBASIC* would purchase it. In my opinion, the pirated copies are being used by people who ordinarily wouldn't purchase it (another program to fool around with).

Allen Huffman
Pineland, TX

HINTS AND TIPS

Editor:

I've noticed several inquiries concerning sources of Ham radio programs. While thumbing through *QST*, the journal for the American Radio Relay League, I ran across this information: Amateur radio software is now available from *SPEC-COM*, the Amateur Radio Specialized Communication Journal. These programs are for the CoCo and are available on tape or disk. A catalog of these programs can be obtained by sending an SASE to *SPEC-COM*, P.O. Box H, Lowden, IA 52255.

Curt Myers, KJ4AA
Benton, KY

Going Bananas

Editor:

I have been using *DeskMate* and am very pleased with it. However, the program has a bug to be considered by users of these printers: Radio Shack LP-7, the Gorilla Banana and the Epson MX-80. For these printers, the Text processor part of *DeskMate*, at the first top line of the second and all later printed pages, prints that line at the left border, not at the normal margin. So that one line is positioned to the left, out of line with all other lines. Radio Shack knows about this and tells me they have no patch for the problem. Test the program with your printer before buying it.

The *DeskMate* terminal program is a beauty, far better than any other terminal programs I've tried. I use the *DeskMate* Terminal program in preference over all others.

I would like to hear from anyone who is able to tell me how to increase the Tex buffer and the Terminal buffer.

Charles E. Brown, J.
Route 1, Box 59
White Stone, VA 22578-976

Starlord Hint

Editor:

Here is a hint for *Starlord* [August 1986 Page 58] to make it easier to find the lin number of a data statement that has an erro in it. This hint will only work if you receiv an FC error in Line 30. You should hav your lines numbered exactly the way the are printed in the magazine. After yo receive the FC error in Line 30, type: `PRIN INT((((I-10240)/8)*10)+60)`

The number you receive is the line numbe that contains the error. Simply list tha number to display the line that contains the error. No line should contain a numbe greater than 255 since 255 is the larges number that can be poked into a single memory location. For those of you whose copy of the program simply locks up after a certain point, recheck your typing. Even if one number is incorrectly entered, the program could crash.

Raju Dash
Downers Grove, IL

REQUEST HOTLINE

Editor:

I would like to find any programs for printing address labels. I have a 16K CoCo 2 ECB with a cassette. Any programs and information would be greatly appreciated.

Karen Krumanocker
609 College Garden Drive
Kutztown, PA 19530

CoCo Cribbage

Editor:

In a recent issue of a competitive magazine I saw a program for a cribbage game for the Commodore and Atari. Does someone have a CoCo version that I might be able to type in and enjoy?

Bill Franken
1358 Sepulveda
San Bernardino, CA 92404

Electronics Programs

Editor:

I have been looking for a program for my electronics hobby. So far I haven't seen or heard of one for the Radio Shack 64K Color Computer. Do you know who sells them? Also, I was told that Radio Shack's 100 Disk Drives can be used with my machine, is this true?

J. DeBruin
236 Pinecove Road
Burlington, Ontario
Canada L7N 1W1

Choo Choo CoCo 2

Editor:

I would like to know how to run a train

set from the CoCo 2. Any help would be greatly appreciated.

Torin Segstro
216 Springdale Circle East
Airdrie, Alberta
Canada T0M 0B0

Attention Numismatists

Editor:

Anyone who has a coin saving program for the CoCo, please write to me.

Blake Cadmus
1106 Whitfield Blvd.
Reading, PA 19609

A Wave of the Wand

Editor:

I am interested in purchasing a text reader for my CoCo. I have hundreds of programs I don't have time to type in. If anyone knows of such a device and the appropriate software to use it for entering programs, please let me know.

Percy Veals
Rt. 1, Box 169
Gloster, MS 39638

DELPHI LINE

Editor:

How about a RAINBOW ON DISK? I know a lot of people would like it. Don't get rid of the tape, just have the disk as well.

Paul Fielding
(PAULFIELDING)

Your prayers have been answered. Look on Page 159 of this issue.

School Daze

Editor:

The CoCo community is growing up! How will the CoCo do in the college scene? What if the "campus computer" is a Macintosh or an IBM? What if there is no "campus computer"? I am sure CoCo owners who will be taking the computer to college with them would be interested in knowing what they're up against. I asked a friend of mine who runs his own business, and unfortunately he had to say that if the campus computer is an IBM or whatever, you either have that computer, you buy it or you flunk out because of incompatibility. If you do your homework on a CoCo, you can't always transfer it to an Apple. People might want to consider what the current computer of a college is when deciding where to go.

I was thumbing through my latest issue of THE RAINBOW and noticed your advertisement for PCM magazine. Could there be any way for readers to use a bar code pen to wave in programs out of RAINBOW? You could add a special part to THE RAINBOW with the codes on it. This would be a fast way to enter programs and might even be cheaper than having to download them from Delphi. I'm sure this would raise the price, but it would be worth it.

Ted Matthews
(SIERRA)
Frazer, PA

INFORMATION PLEASE

Editor:

I am a licensed Ham radio amateur, W2SAD, looking for a program for the CoCo that will function as a Bulletin Board on packet radio. These programs are called Packet Bulletin Board System (PBBS) and are used with a Packet controller (TNC 2) developed by Tucson Amateur Packet Radio in Tucson, Ariz., on allocated amateur radio frequencies. There are PBBSs that have been written for the IBM and Xerox computers, but I can't find any for the CoCo. Anyone with information on how to obtain a PBBS program for the CoCo please write me.

Harry Warren
19 New York Avenue
Lavallette, NJ 08735

Multi-Pak Fix

Editor:

I understand there is a fix required on the old Multi-Pak before it will work on the CoCo 3. Will I be able to use my 512K chips to upgrade my 128K CoCo 3?

Leonard H. Reed, Sr.
190 Cleaveland Road #1
Pleasant Hill, CA 94523

The "fix" for the Multi-Pak is, at this time, only expected to be available through Radio Shack service centers. It involves a chip replacement. The new CoCo 3 uses a satellite board (special circuit board) for 512K upgrades. The board comes with 16 256K by 1-bit dynamic RAM chips.

CoCo Max Questions

Editor:

I own a CoCo 2 ECB and am going to buy a printer for *CoCo Max*. I have seen an Olivetti PR-2300 ink-jet printer in the DAK catalog. If I have a serial to parallel converter, can I use this printer with *CoCoMax II*?

Cliff Geier
Rt. 1, Box 245
Fairview, WV 26570

To our knowledge, this printer is not supported by CoCoMax II. *We suggest you contact Colorware.*

Hayes Compatibles

Editor:

I am looking for information on DAK or other Hayes-compatible 1200 Baud modems.

Chad Stuckey
254 S. Ringold
Boone, IA 50036

Pokin' Along

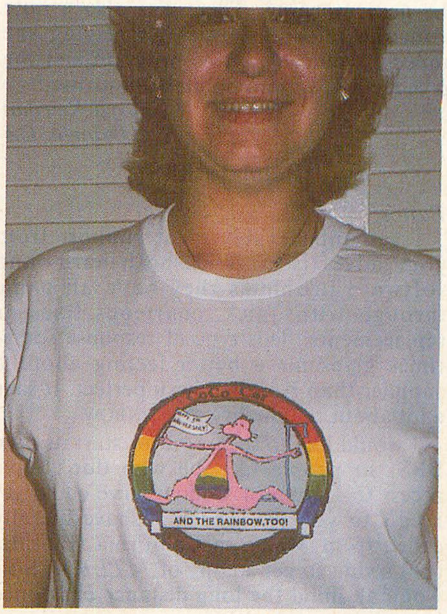
Editor:

I have bought the last few editions of RAINBOW and found some very helpful POKEs and EXECs. I would like to know if anyone knows of other helpful POKEs and EXECs. Any reply would greatly be appreciated.

Warren Hudym
Box 174
Wapella, Saskatchewan
Canada S0G 4Z0

Microcom Software sells 500 Pokes, Peeks and Execs. *See their ad on Page 17.*

CoCo Cat Art


AND THE RAINBOW, TOO!

Rochelle Sherman
Levittown, NY

BOUQUETS AND BRICKBATS

Editor:

I would like to tell your readers about the excellent service of two of your advertisers. The first is The Software House of Redford, Michigan. I saw their advertisement on Page 162 of the August 1986 issue. I decided to order eight of their color ribbons for the SG-10 printer. I mailed my order with a check and within one week I received the eight ribbons plus two extra ribbons. Mr. Dallas Cox wrote on my invoice that they had recently added purple ribbons to their color assortment and he was including two of these ribbons at no extra charge. I would like to thank Mr. Cox for his friendly, fast service, and would like to encourage others to deal with The Software House. By the way, the ribbons are great!

Second, I would like to congratulate Dayton Associates. The first time I called to order their SG-10 printer package, I was greeted by an answering machine. I left my name and number, and the next day Dayton Associates returned my call. I ordered the printer C.O.D. and in four days it was on my doorstep. I was pleased with the packaging, and the manual was easy to understand. Not only would I like to thank Dayton Associates for their prompt, courteous service, but thank Star Micronics for making such a fine printer as the SG-10. I can only imagine the quality of their new NX-10.

Brian Biggs
Grove City, OH

Fast Service Praised

Editor:

I would like to make a few comments about some of your advertisers. I have purchased about $1,000 worth of equipment from Computer Plus in the last five years and have been more than satisfied. They give fast service and good prices. But can you top this? I ordered *Graphicom* by phone from Moreton Bay Software about noon one day and found it laying at my front door early the next morning. There was also a note from the telephone sales girl saying she hoped I would enjoy the program and she gave me a few extra pointers on its use.

Floyd Keirnan
Orange, CA

Rainbow BBS?

Editor:

I get unbelievably great support from your advertisers. With both hard- and software problems they have all came through with quick, courteous fixes or replacements. This type of response sometimes gives me a better feeling about a supplier than if all had been perfect. It says a lot about the quality of RAINBOW.

I would like to see RAINBOW start its own BBS, so people like me who don't have access to Delphi or CompuServe could get access to you via modem. I have literally called from Maine to California (Florida, too) trying to get a copy of *MTERM*. So I wouldn't mind the long distance calls once in a while to your BBS.

Art McDaniel
Ferndale, CA

User Hostile

Editor:

I agree heartily with the comments published in your magazine regarding the user hostility of *VIP Writer*. In fact, I find the entire *VIP Library* to be user hostile.

What is even worse, though, is the attitude of the publishers of the *VIP Library*. I have written to Softlaw three times over the past year or so asking for help in using the math package contained in *VIP Database*. Thus far, I've not been shown the courtesy of a reply of any kind whatsoever by Softlaw. That, to me, is the ultimate in "user hostility."

E.W. Rees
Yaupon Beach, NC

Don't Forget Us

Editor:

With all the excitement over the new CoCo 3 please don't forget there are still those of us struggling along with the old gray machine who would like to learn more of the secrets of its use.

H.W. Regester, Jr.
Corsicana, TX

See Jim Reed's "Building July's RAINBOW" July 1986, Page 16.

No Silly Advice

Editor:

I am writing because I am afraid that a very helpful tip that was passed on may have not been taken seriously by some of your readers.

I have a 64K CoCo with cassette and I have been plagued for some time with I/O errors, especially with machine language programs. Some programs, including my screen dump, have proved impossible to load. When I read the suggestion offered by Rick Bullon [June 1986, Page 163], I chuckled. Turn your recorder upside down! Stupid! Unscientific! No good solution is free.

Well Rick, after tucking my tongue in my cheek, bearing in mind that this silly lark was costing me nothing, I tried it. Rick, I now have just three words for you — it works, thanks!

Paul Fullerton
Gardiner, ME

Too Technical!

Editor:

Thanks to your magazine, the Color Computer is one of the best consumer products on the market. The articles elaborating on the existing programming structure provide extreme flexibility.

Why are all of the OS-9 articles reading like a lab report? Did someone forget that OS-9 comes with all the technical specifications and minus the information required to get the individual pieces of your system operating (so you can experiment)? The Guide to OS-9 could be a good manual. The missing operators manual is quite normal when you let engineers do the paperwork. All of the high-tech goodies-bag without the proper organization has promoted the impression that OS-9 is just a digitized Edsel. Just getting the printed word to the buyers of these products should go a long way to eliminating the unending articles on computer-market apathy.

Michael L. Millard
Douglas City, CA

A Color Black and White TV

Editor:

The "Loose Strings" cartoon by Tron [September 1986, Page 166] isn't nearly as funny as you think! There is a program available for the TS1000 (Russell Electronics) which does produce color graphics on a black and white TV by a pulse-modulation technique. Put one of your programmers to work on that for the CoCo!

B.R. Pogue
Lake Havasu City, AZ

A 'Prize Winning' Idea

Editor:

I was thinking about an annual RAINBOW magazine cover contest, where subscribers could make a cover picture using *Graphicom, CoCo Max* or any program to make a cover for your magazine. Their prize is having it printed on the cover of the RAINBOW! So what do you think?

Jeff Kilsdonk
Milwaukee, WI

Nice idea, Jeff. In the meantime, try your artistic talents on "Envelope of the Month" or "CoCo Gallery."

PEN PAL

Editor:

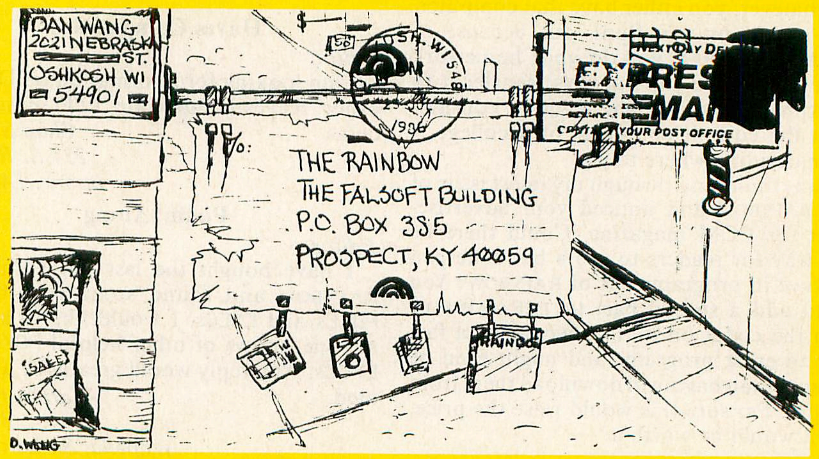
I'm Brazilian and a RAINBOW reader. I have a 64K ECB CoCo and I'd like to correspond with other CoCo owners around the world.

Eduardo Akira Watanabe
R. Major Fraga, 4-155
Bauru - SP - Brazil 17100

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

ARTS AND LETTERS



Envelope of the Month

Dan Wang
Oshkosh, WI

Help Us Battle the High Cost of Disk Drives

PREBLE'S PROGRAMS
1983

NOW . . .
V-PRINT
A utility to print directory on paper
$9.95

New Lower Price
Un-DISK Drives ~~$49.95~~? $34.95

You Bet! There are empty spaces in your 32K and 64K CoCo. The Preble VDOS Un-DISK helps you fill them up with PROGRAMS!

- Un-DISK uses your computer's extra memory like a fast disk drive.
- Un-DISK can store BASIC and MACHINE LANGUAGE programs.
- Un-DISK is INVISIBLE. Yup! Un-DISK does not interfere with normal Color Computer Operation.
- Un-DISK appears only when you type the magic word VDOS.
- Un-DISK comes with comprehensive instructions which you may not need because:
- Un-DISK is self-prompting and easy to use!
- Un-DISK is provided on cassette.
- Un-DISK is faster than a slow clumsy DISK DRIVE and best of all . . .
- Un-DISK is CHEAPER than a DISK DRIVE!
- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

EXTRA . . . EXTRA . . . EXTRA . . . EXTRA . . .
Additional Power For $14.95

Only with VDUMP for the Un-DISK!

- VDUMP lets you make a cassette backup copy of everything stored in the Un-DISK.
- VDUMP lets you save 5, 10, 15 or more programs on a single cassette tape file.
- VDUMP lets you switch Un-DISKs. With a single load operation replace a group of financial programs with a set of children's programs. (The new VDUMP tape overwrites the old.)
- VDUMP can allow you to save a whole lot of RAINBOW ON TAPE in a SINGLE file.
- VDUMP is the perfect companion to the Preble VDOS Un-DISK.

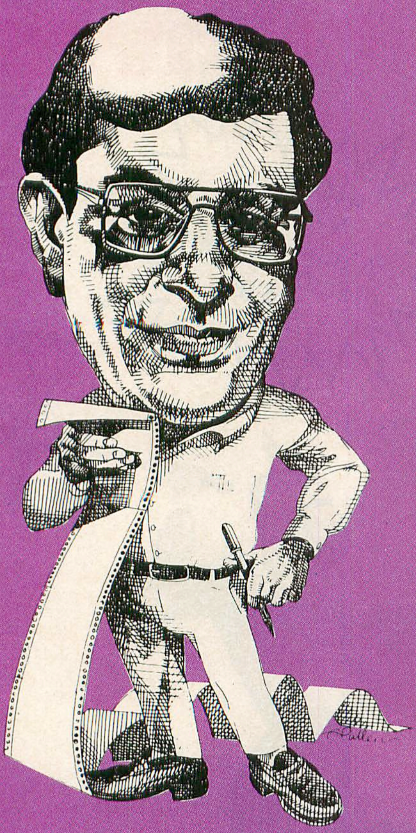
Available from Doctor Preble's Programs, naturally! Bringing you fine Color Computer Products Since 1983!

The Preble VDOS Un-DISK	**$34.95**
The Preble VDUMP	$14.95
Shipping & handling U.S. and Canada	$1.50
or $5.00 to other foreign points	

VISA and MasterCard accepted

DR. PREBLE'S
SINCE 1983
PROGRAMS

Order From:
Dr. Preble's Programs
6540 Outer Loop
Louisville, KY 40228
(502) 966-8281
Canadians may order from Kelly Software



Tandy's Got "IT"

I must confess that I am in some bit of trouble here. Despite the fact that I am a stickler for deadlines being met, it seems I am about to miss mine for this column. If there is a blank space rather than these words, you'll know I didn't make it (and probably got keel-hauled in the process).

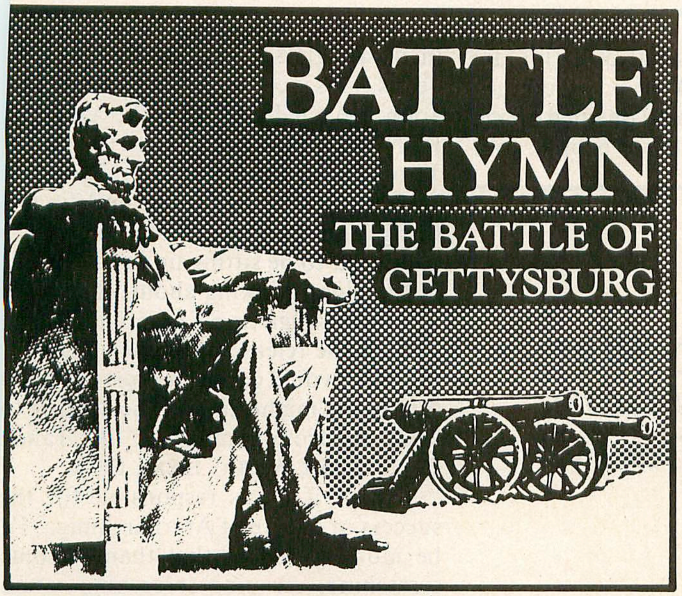
There is a good reason, though. The person to blame is a Maine resident by the name of Stephen King.

King *(Salem's Lot, Carrie, Cujo*, etc.) has had the audacity to release his latest novel, *It*, right at deadline time. I have been haunting (pun intended) the bookstores for its appearance. Now that *It* has arrived, I've had my nose deep in its 1,100-plus pages for nights and nights.

It is one of those books that is best to read by the strong light of a sunny day; but nighttime is about the only time I have had to read it (night is also when I usually write this column). King has not only written a good story in *It*, but he has crafted the story so that it is just pure pleasure simply reading it. I'm savoring the book but, like all good scary books, it also gives me some unsettling moments.

Since I have not yet finished *It*, I think the "It" of the title is that dark, undefinable something that hangs out in basements, attics, pipes, under porches and in dark hallways. Everyone has confronted It at some time or another. It is the one thing you fear most. It might be a vampire, wolfman and/or mummy, but usually It is without definition — other than It. Unfortunately, with an active mind, and reading the book at night, It has been hovering close to the house.

So, last night, the dog had to go out about 2 a.m. After a dozen or so plaintive whines, I put *It* down and took him. He charged down the stairs onto a wooden floor in the dark and his claws made this absolutely terrifying scratching noise in the darkness. Just for a moment there, I wondered whether It was down there, too. Let's be charitable and say I hastened to turn on the light.



64K Disk or Tape BATTLE HYMN — The Battle of Gettysburg

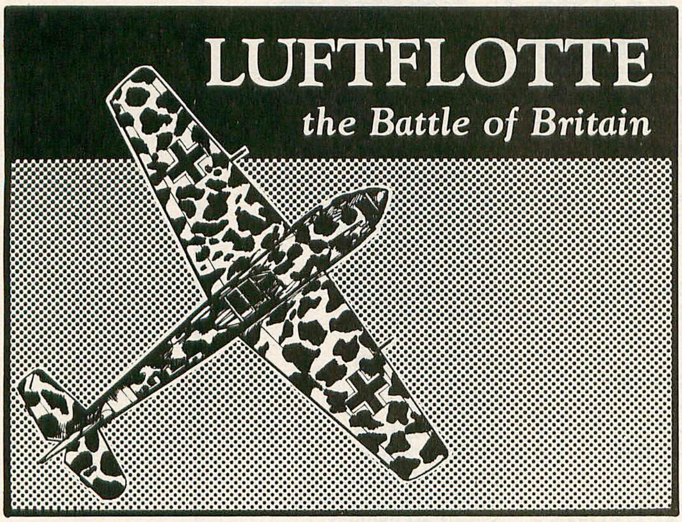
Player controls Lee's army of 11 divisions (39 individual) brigades including 3 cavalry (Stuart) and 3 artillery (Alexander) and must capture 5 victory objectives to win decisively. It's all here, from Culp's Hill to Little Round Top, from Pickett's charge to Hood's heroic victory at Devil's Den.

Play starts on the second day of the battle with Johnson, Early and Rodes facing an unreinforced Union line running from Culp's Hill down to Cemetery Hill and east. Player has early size advantage but must act quickly as Union reinforcements are seen arriving; and must form the line and charge up hill over a great distance. Where is Stuart?

Brigades must be turned to march or fire. Union troops must reload after firing.

Player may limber or unlimber cannon; must watch his fatigue factors and prevent troops from routing. The object is to force the flank and pin the enemy in a cross fire. Easier said then done. Very historic, with an Ark Royal touch.

Hi res graphics; machine language. Game save. Play takes 3-5 hours. **$29.00**



64K LUFTFLOTTE — The Battle of Britain

Player takes the German side and tries to succeed where Goering and the entire Luftwaffe failed: destroy Britain's will to fight from the air.

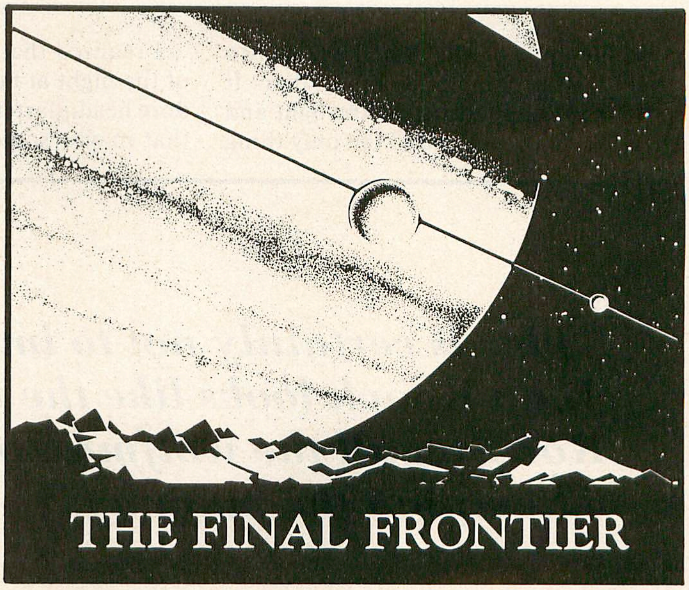
A mammoth game, Luftflotte has it all. Twenty-four British cities producing one of six war materials: petroleum, armaments, aircraft, shipping, morale, electronics; 26 air bases, 18 low radar sites, 17 high radar sites all forming a complex web of intercommunication and defense. Can you break the web?

Player controls 3 Luftflottes of over 2000 individual planes including Stuka, Junkers, Dornier and Heinkel bombers; Me110 and Me109 fighters. Player may launch bomb runs, recon missions, strafing sorties or transfers: up to five flights per Luftflotte.

Player watches as his flights head for London or Bath or Glasgow or lorad site 'j' or . . . It's up to you. There are 85 individual targets in the game.

Hi res screen shows aerial combat, bombing and strafing missions and supplies brief information. Watch targets and planes explode! Semigraphic strategic map of England and targets. For conclusive information, view the intelligence screen to see everything. Unless, of course, you prefer playing EXPERT in which case you'll be flying blind as the real Germans did not so long ago.

Playing time: 3-6 hours. Game save. Machine language. **$29.00**



32K Disk Only THE FINAL FRONTIER

You have been chosen as commander in a struggle to gain control of an unexplored section of the galaxy. Your foe: an alien race called VOLSUNG. Here in the distant future, when space travel has become commonplace, on uncharted star systems you hope to find the raw materials which are vital to your industry and construction of a fleet of space craft.

Starting with limited ships and resources, you must quickly search, locate and bring needed systems under your influence, before the aliens can gain a foothold and threaten your expansion.

A star system can support industry, mining, energy or farming. You must decide on how to concentrate your efforts to maintain a balance to best serve your needs for developing your civilization and producing new space craft. Spacecraft that you will surely need when you and the alien VOLSUNGS eventually collide in a titanic struggle for the cointrol of the Final Frontier.

100% hi res, total machine language, disk based. **$25.00**

the KEYBOARD GENERAL

Isn't it time for a newsletter/magazine that talks about the games you've been playing? An in-depth resource of playing hints, strategies and tactics? Wouldn't it be nice to whip the computer?

The *Keyboard General* is published bi-monthly. We'll publish your letters; your game plays, your thoughts and ideas. You'll hear from us, our program authors. You'll learn gaming, playing and programming hints, and perhaps discover new ways to assault that village or attack that flank.

Every month we'll feature a Company Commander replay; discussion of new and old products, and letters from you. There will be special discounts and promotions offered only subscribers of the *Keyboard General.*

Don't miss out! The *Keyboard General* is filling a great need in the software industry: a publication dedicated to discussing those programs you've been playing. Subscribe today, and find out how to beat the computer! **$15.00 year subscription**

ARK ROYAL GAMES
P.O. Box 14806
Jacksonville, FL 32238
(904) 786-8603

ARK
ROYAL
GAMES

Prices include shipping to U.S., APO's, and Canada. COD's (USA only) add $3.75. Florida residents add 5% sales tax. All orders shipped within 24 hours. Programs require Color Computer (Tandy Corp.). Be sure to state system when ordering.

While opening the door I decided to think about something other than It (after all, I had to turn off the light and go back up the stairs and the only thing my dog guards with any competency whatsoever is his dinner bowl). And, naturally, since I was feeling guilty about it anyway, I thought about this column.

> ***"This is certainly not to imply that John Roach looks like the vampire, Ron Stegall the wolfman or Barry Thompson the mummy."***

I realized that it was also the middle of the night at both Atari and Commodore headquarters, and it dawned on me that maybe some of those people, too, were awake and worried about their own It.

And then, flights of fancy being what they are, I decided that It for Commodore and Atari people might be lurking in a tall glass tower in Fort Worth Texas. This is certainly not to imply tha John Roach looks like the vampire Ron Stegall the wolfman or Barr Thompson the mummy. But, remember, It is really the one undefinabl thing you fear the most. And, if I happened to be sitting up in the middl of the night thinking about what to d with my Amiga or ST computer line in view of the release of the new CoCo 3, I think it would certainly cross my mind that my It might, indeed, be coming to "get" me from somewhere like Tandy Center, Fort Worth, Texas, USA.

I think if I was responsible for the success or failure of Atari or Amiga, I'd be more scared of that than of some scratching, scraping screeching sound that *might* be a dog's claws on a wooden floor in the dark — or might not.

As Steven King, a good New Englander, would probably say, "ayuh."

— Lonnie Falk

TCE's 5th Anniversary Catalog is now available!

IF YOU OWN A TANDY COMPUTER THERE'S SOMETHING FOR YOU!

PROGRAMMING TOOLS
DEFT PASCAL WORKBENCH
DEFT EXTRA
DEFT 3D GRAPHICS SAMPLER

WORD PROCESSING
CHILD WRITER
MEMO WRITER
BUSINESS WRITER

DATA MANAGERS
CHILD FILER
LIST MANAGER
BUSINESS MANAGER

SPREADSHEETS
CHILD CALC
SIMPLE CALC
BUSINESS CALC

EARLY LEARNING
ABC's IN COLOR
ALPHA MEMORY
HAPPY COUNT
MIX AND MATCH
MR. BEAR COUNT
MR. BEAR SPELLER
MR. PIGGY
SEE AND SPELL
TEACHING CLOCK

MATH SERIES
BASIC MATH
CRISS CROSS MATH
CRISS CROSS PLUS
FLASH CARD
FRACTIONS
FRACTION DESTROYER
FRIEND OR FOE
MATH BOMBER
MATH REVIEW
MR. BEAR FLASH CARD
MR. BEAR MATH
PLACE VALUES
REDUCING FRACTIONS
RESCUE MATH

LEARNING ACTIVITIES
ALPHA ATTACK
CAPITAL MATCH
HISTORY QUIZ
MATH QUIZ
MEMORY MATCH
QUIZ GAME
UNITED STATES
VOCAB BRUSH-UP

LANGUAGE ARTS
ALPHABETIZE
ANTONYM EXPRESS
ANTONYM MATCH
COMPUTER EASE
CRISS CROSS SPELL
ENGLISH REVIEW
HOMONYMS
NOUNS
NOUNS REVIEW
PLURALS
PRONOUNS
SAVE THE FISH
SPELL BOMBER
SPELLING RULES
SUPER SPELL BOMBER
SYNONYM EXPRESS
SYNONYM MATCH
TORPEDO SCRAMBLE
VERB REVIEW
WEEKLY SCRAMBLER
WEEKLY SPELLER

100% SATISFACTION GUARANTEE

TCE

CALL us at 1-(800)-4TC-4TCE or 1-(301)-963-3848
for a FREE TCE Software catalog and the latest copy of TCE NEWS.

RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus

The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you *reach* the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS,* type in the program and `CSAVE` it for later use, then type in the command `RUN` and press ENTER. Once the program has run, type `NEW` and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

The Rainbow Seal

RAINBOW
CERTIFICATION
SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

BUILDING NOVEMBER'S RAINBOW

A Look at Copyrights . . .
. . . and Your Right to Copies

This is our telecommunications issue and a prime topical thread in any form of telecommunications revolves around the use and abuse of copyrights. Perhaps my brief treatment here will stimulate individual reading and group discussion, both in club meetings and on bulletin boards and national information services.

A prime source of confusion is that many people familiar with the old copyright law preach it as gospel despite the fact a new law has been in force for years. Prior to 1978, under the old law, for something to be protected it had to be published with a copyright notice *and registered* with the U.S. Copyright Office in Washington, D.C.

Under present law, it's extremely easy to get a limited copyright. If you put a notice of copyright (where it can be easily seen) on every copy of the work that reaches the public, this alone — without further action — will afford protection for *a period of five years*. To get more permanent protection, you must register your work with the copyright office within five years after the work is made public. (The U.S. has reciprocal copyright relations with many countries — including Russia, so, I hope we copyright defense stuff!)

Copyrights used to be granted for 28 years and could be extended for another 28 years. That was under the old law. Now, a copyright lasts for your lifetime and 50 years after your death. In the case of companies, not individuals, holding copyrights, the copyright is for 75 years from the year in which it was first published, or 100 years from the date it was created — whichever is shorter.

Now, *copyright ownership* and ownership of the *material object* in which the copyright work is embodied are entirely separate things. That is, an artist, for example, could copyright a painting and then, if he chooses, convey that copyright to someone else, a publisher, for instance. But, he could keep the painting, since transfer of the material object does not in itself convey any rights under the copyright. By the same token, in going to a store and purchasing a copy of a book — or a piece of software — you do not acquire the copyright to it. You could pass that individual copy of the book around until the pages fell out, but you do not have the right to reproduce it merely because you bought a copy. Similarly, the law forbids you to reproduce copyright computer programs.

While, often, all rights are sold in one transaction, there are several separate rights protected by copyright laws and *each can be sold individually* without affecting ownership of the other rights. You might, for example, retain book and/or movie rights while selling only first North American serial (magazine) rights, and retaining other serial rights.

So, all you need do to copyright something is put the proper notice on all the copies that go to the public; registration is not necessary. But if you want to do something about copyright infringement, that is another matter! A copyright owner who has not registered his claim can, of course, sue someone who has infringed on his claim, but he *cannot enforce his claim until he has registered his work* — either before filing a suit or during the trial. It must be registered before a judgment can be rendered.

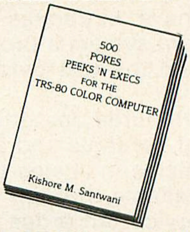
Unfortunately, there is a widespread notion that the original author retains some sort of rights to public domain material, such as a computer program he or she wrote. While there may be some moral obligation to the author, in copyright law, a creative work is in the public domain if it is not covered by a copyright or if its copyright has expired. Once in the public domain (that is, distributed to the public without copyright protection), it is fair game and cannot simply be "jerked back out" of public domain, nor can it be copyrighted by anyone else. When the copyright expires or the material is placed in the public domain, the copyright owner loses all rights to the work and it may be freely copied or reproduced by the general public.

Now, concerning so-called "collective" copyrights, a compilation of non-original material can be copyrighted. Nonetheless, any copyright material remains the property of the copyright *owner* and public domain stuff is still public domain.

So, a copyright is your exclusive right to control the distribution, copying, sale or publication of any form of communication that can be recorded in any tangible medium. It is a valuable piece of property, without which publications such as THE RAINBOW would not be possible. And, while we retain RAINBOW's copyright, you can purchase the right to receive 12 copies with a one-year subscription; I hope you'll choose to exercise that right.

— Jim Reed

500 POKEs, PEEKs, 'N EXECs
FOR THE TRS-80 COCO



NEVER BEFORE has this information of vital significance to a programmer been so readily available to everyone. This book will help you 'GET UNDERNEATH THE COVER' of the Color Computer and develop your own HI-QUALITY Basic and ML programs. SO WHY WAIT??
This 80-page book includes POKEs, PEEKs and EXECs to:

- ★ **Autostart** your basic programs
- ★ **Disable** Color Basic/ECB/Disk Basic commands like LIST, LLIST, POKE, EXEC, CSAVE(M), DEL, EDIT, TRON, TROFF, PCLEAR, DLOAD, RENUM, PRINT USING, DIR, KILL, SAVE, LOAD, MERGE, RENAME, DSKINI, BACKUP, DSKI$, and DSKO$.
- ★ **Disable** BREAK KEY, CLEAR KEY and RESET BUTTON.
- ★ **Generate** a Repeat-key.
- ★ **Transfer** ROMPAKS to tape (For 64K only).
- ★ **Speed Up** your programs.
- ★ **Reset**, MOTOR ON/OFF from keyboard.
- ★ **Recover** Basic programs lost by NEW.
- ★ **Set** 23 different GRAPHIC/SEMIGRAPHIC modes
- ★ **Merge** two Basic programs.
- ★ **AND MUCH MUCH MORE!!!**

COMMANDS COMPATIBLE WITH 16K/32K/64K/COLOR BASIC/ECB/DISK BASIC SYSTEMS and CoCo I and CoCo II.

ONLY $16.95

ORDER TODAY! VISA, MC, Am Ex, Check or MO. COD add $2.50. Please add $3.00 S & H (USA & Canada, foreign add $5.00). NYS residents pl. add sales tax. All orders shipped WITHIN 24 HOURS!!!

MICROCOM
SOFTWARE
P.O. Box 214 Fairport, N.Y. 14450
Phone (716) 223-1477

WE HAVE ALL THAT YOU NEED TO SUCCEED

UTILITIES/BOOKS

UTILITY ROUTINES

UTILITY ROUTINES for the TANDY & TRS-80 COCO (Vol 1)

This powerful book for Basic and ML Programmers, includes program explanation, memory requirements and an annotated source listing for the utility routines given below. These routines if bought individually will cost you HUNDREDS OF DOLLARS.

These are 100% Position Independent ML Utilities and require no ML programming knowledge.

COMMAND KEYS: Access commands with 2 keystrokes.
CURSOR STYLES: Over 65000 cursor styles.
ERROR SKIP: 'ONERR GOTO' for Basic Programs.
FULL LENGTH ERRORS: Get real word error messages.
KEY CLICKER: Ensure key input accuracy.
REPEAT KEY: Repeat ANY key.
REVERSE VIDEO (Green & Red): Eliminate eye-strain.
SPOOLER: Don't wait for those long printouts.
SUPER SCROLLER: Save/view scrolled lines.
TAPE-TO-DISK: Copy Basic and ML programs.
AND MUCH MUCH MORE!!!

For 16K/32K/64K Cassette or Disk Systems, CoCo I & CoCo II.

BOOK $19.95

THESE ROUTINES (READY-TO-RUN) ON CAS/DISK:

$24.95

BOTH BOOK AND CASSETTE or DISK:

$36.95

OTHER "MUST" BOOKS

UNRAVELLED SERIES: These 3 books provide a complete annotated listing of the BASIC/ECB and DISK ROMs.

COLOR BASIC UNRAVELLED: $19.95
EXTENDED BASIC UNRAVELLED: $19.95
DISK BASIC UNRAVELLED: $19.95
ALL 3 UNRAVELLED BOOKS: $49.95
RAINBOW GUIDE TO OS-9 (Book): $18.95
RAINBOW GUIDE TO OS-9 (2 Disks): $29.00
BASIC PROGRAMMING TRICKS: Tips and tricks for Basic Programmers. Only **$14.95**

SUPER TAPE/DISK TRANSFER

- Disk-to-Disk Copy (1 – 3 passes)
- Tape-to-Disk Copy
- Tape-to-Disk Automatic Relocate
- Disk-to-Tape Copy
- Tape-to-Tape Copy

Copies Basic/ML programs and DATA files.
32K Disk System
(Disk to Disk Copy requires 64K)
DISK ONLY **$24.95**

NEW!

SUPPLEMENT to 500 POKES, PEEKS 'N EXECS

ONLY **$9.95**

200 additional Pokes, Peeks 'n Execs to give you MORE PROGRAMMING POWER. Includes commands for:

- **Rompak Transfer to disk**
- **PAINT with 65000 styles!**
- **Use of 40 track single/double sided drives with variable step-rates**
- **High-Speed Cassette Operation**
- **Telewriter 64®, Edtasm+® and CoCo Max® Enhancements**
- **Graphics Dump (for DMP printers) & Text Screen Dump**
- **AND MUCH MUCH MORE!**
- **500 POKES, PEEKS 'N EXECS is a prerequisite**

UTILITY BONANZA I

Includes 20 best-selected utilities:

- **40K Disk Basic** • **Disk Cataloger**
- **Super Tape-to-Disk Copy (with Automatic Relocate)**
- **Disk-to-Tape Copy**
- **LList Enhancer (with page numbering!)**
- **Graphics Typesetter (two text sizes!)**
- **LARGE DMP Graphics Dump**
- **X-Ref for Basic Programs**
- **Hidden 32K (Use the "hidden" 32K from your 64K CoCo)**
- **Basic Stepper (Super Debugger!)**
- **RAM Disk (for Cassette & Disk Users)**
- **Single Key Printer Text Screen Dump**

AND MUCH, MUCH MORE!!!

DISK (64K Req.) ONLY **$29.95**

OTHER SOFTWARE . . .

Telewriter-64	(Cas) $47.95 (Dsk)	57.95
Teleform: Mail Merge for TW-64®		19.95
Telepatch (Dsk)		19.95
CoCo Max (Cas)		67.95
CoCo Max II (Dsk)		77.95
CoCo Max Upgrade (Dsk)		18.95
Pro Color File (Dsk) (includes SIMON)		54.95
Dynacalc (Dsk)		79.95
Autoterm (Cas)		36.95
(Latest Version) (Dsk)		46.95

COCO UTIL II (Latest Version): Transfer CoCo Disk files to IBM compatible computer. Transfer MS-DOS files to CoCo. ONLY **$36.95**

DISK ANTI-PIRATE: Best copy-protection program for disk Basic and ML programs. ONLY **$59.95.**

HIDE-A-BASIC 1.1: Best copy-protection program for Cassette Basic programs. ONLY **$24.95.**

(Both Disk Anti-Pirate & Hide-A-Basic 1.1 for ONLY **$79.95)**

CABLES/HARDWARE

UNIVERSAL VIDEO DRIVER: Use your monochrome or color monitor with your CoCo (ALL CoCos). Includes audio connection. Easy installation – no soldering. ONLY **$29.95**

INTRONICS EPROM PROGRAMMER: Best EPROM Programmer for the CoCo. Lowest Price Anywhere – **$137.95.**

RS232 Y CABLE: Hook 2 devices to the serial port. ONLY **$18.95.**

MICROCOM 2 POSITION SWITCHER: Select any one of two RS232 devices (printers/modems) from the serial port. ONLY **$29.95.**

MICROCOM 3 POSITION SWITCHER: Select any one of three RS232 devices (printers/modems) from the serial port. ONLY **$34.95.**

Y CABLE: Use your Disk System with CoCo Max, DS69, etc. ONLY **$24.95.**

DISKETTES (10): BONUS Brand SS/DD diskettes for the CoCo. 100% Guaranteed. **$12/box.**

MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

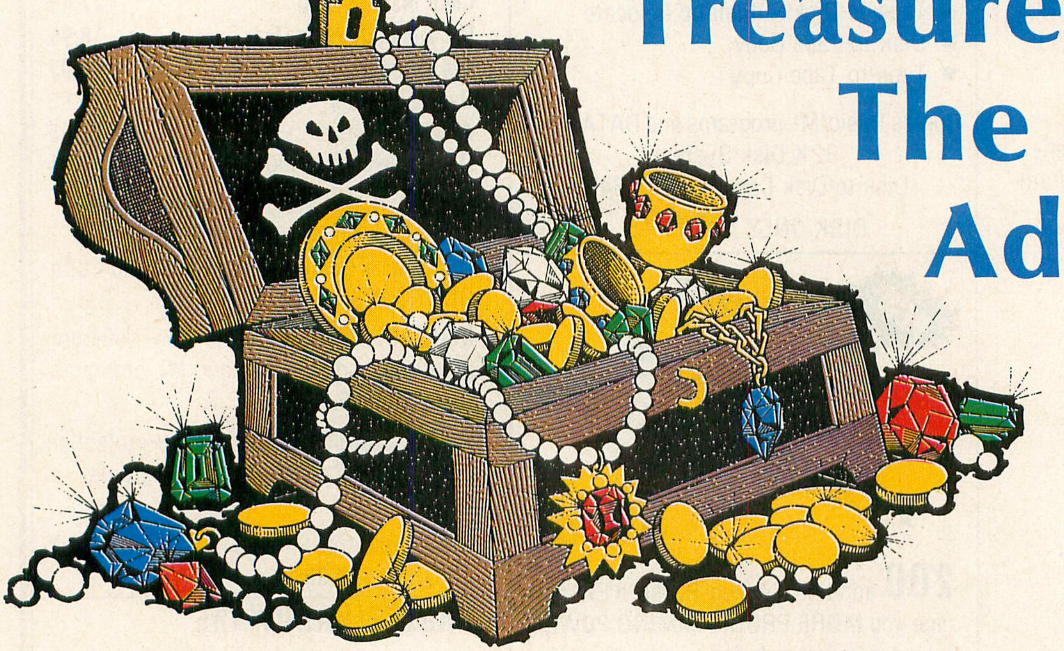
Our software/books are available at all leading dealers in USA, Canada and Australia. To Order: **Order by phone & get a $2 refund for your phone call.** VISA, MC, Am Ex, Check, MO. Please add $3.00 shipping and handling (USA & CANADA, other countries $5.00). COD add $2.50 extra. NYS residents please add Sales Tax. Immediate shipment. Dealer inquiries invited.

MasterCard AMERICAN EXPRESS VISA

24-HOUR ORDER HOT LINE (7 DAYS A WEEK): (716) 223-1477

Use your spring-centered joystick to feel the effects of this game on your "man"

Treasure Quest: The Golden Adventure



By Eric Tucker

You've made it to the second room. All is quiet, and right across from you is a gold bar! As you look around the room, you count a total of five bars of gold. You check the walls, but see nothing. Looking at the floor, there's nothing but gold. You step across the floor, and fall into a pit.

Treasure Quest is an arcade Adventure game that requires a 16K Extended Color BASIC CoCo with one joystick. It uses the speedup `POKE` (`POKE 65495,0`). If your machine can't handle it, edit lines 160 and 1130 to delete it.

The title screen has two parts. The first uses CoCo's eight colors and `CHR$` blocks to write the title. The second is the graphics screen which shows you entering the castle.

The castle has three rooms: the Vacuum Room, the Magic Pit Room and the Wind Tunnel. In all three rooms your man is the blue square.

In the Vacuum Room, there is a large bar of gold on the other side of the room. You must cross the room, get the gold and return to the blue door. On either side of the room are two large ducts. Avoid both of them, or you'll get pulled in by the suction from the duct. If you get close to the gold, you may be repelled by an invisible force field. It comes and goes at random, so keep trying. Once you get the gold, you must go back across the room to the blue door to get out.

The second room is the Magic Pit Room. There are five bars of gold situated throughout the room. Surrounding them are large, square, disappearing pits. You must avoid getting caught when one appears or down you go! After picking up all the gold, a small blue key may appear on the screen. Pick up this key and you are awarded 100 points and an extra man. However, you must then go back and go through the room again.

The third room, the Wind Tunnel, is the easiest of the three. To your right is a large fan and three gold keys. To the left is a blue spiked wall. You must fight against the fan to get the three keys. During your struggle, the spiked wall moves slowly but surely toward you. Once you reach all three keys, you are congratulated, then sent back to the Vacuum Room.

To begin, you are given three men. The only way to gain an extra one is to get the small blue key in the Magic Pit Room. All treasures except the blue key are worth 250 points. You automatically get five points each time you move. In the Vacuum Room, you must pass between the ducts to get the points. After passing all three boards, you are given another 100 points.

At the end of the game, your score and the high score are displayed. A spring-centered joystick should be used to best feel the effects of the first and third rooms. I hope to see some of your scores on the Scoreboard.

If your man doesn't look like a square, press BREAK and run the program again.

(Questions about this program may be directed to the author at 2950 Park Avenue #114, Bronx, NY 10451, 212-665-1821. Please enclose an SASE when writing.) ☐

Eric Tucker lives in the Bronx and is a 17-year-old student at Baruch College. He is studying for a bachelor's degree in computer science. He owns both an MC-10 and a CoCo, but programs exclusively on the CoCo.

140	121	760	120
230	72	900	17
360	89	1010	104
470	209	1130	67
580	147	END	181
640	171		

The listing: TREASURE

```
20 CLEAR200:DIM MAN(9,11)
30 PCLS:DRAW"C3":LINE(100,92)-(1
04,96),PSET,BF:GET(98,88)-(108,9
8),MAN,G:SC=0
40 CLS0:C=0
60 FORT=1TO8:PRINT@34,STRING$(3,
143+(C*16));:PRINT@67,CHR$(143+(
C*16));:PRINT@99,CHR$(143+(C*16)
);:PRINT@131,CHR$(143+(C*16));
70 B$=CHR$(143+(C*16)):B2$=CHR$(
140+(C*16)):B3$=CHR$(131+(C*16))
:G$=CHR$(128)
80 PRINT@70,B$+B$+G$+B$+CHR$(140
+(C*16))+B$+G$+B2$+B2$+B$+G$+B$+
B2$+B2$+G$+B$+G$+B$+G$+B$+B$+G$+
B$+B2$+B$;
90 PRINT@102,B$+G$+G$+B$+B3$+B$+
G$+B$+B2$+B$+G$+B2$+B2$+B$+G$+B$
+G$+B$+G$+B$+G$+G$+B$+B3$+B$;
100 PRINT@134,B$+G$+G$+B$+B3$+B3
$+G$+B$+B3$+B$+G$+B3$+B3$+B$+G$+
B$+B$+B$+G$+B$+G$+G$+B$+B3$+B3$;
110 PRINT@200,B$+B$+B$+B$;:PRINT
@218,B$;
120 PRINT@232,B$+G$+G$+B$+G$+B$+
G$+B$+G$+B$+B2$+B$+G$+B$+B2$+B2$
+G$+B2$+B$+B2$;
130 PRINT@264,B$+G$+CHR$(137+(C*
16))+B$+G$+B$+G$+B$+G$+B$+B3$+B$
+G$+B2$+B2$+B$+G$+G$+B$;
140 PRINT@296,B$+B$+B$+B$+G$+B$+
B$+B$+G$+B$+B3$+B3$+G$+B3$+B3$+B
$+G$+G$+B$;:PRINT@332,CHR$(136+(
C*16));
150 C=C+1:NEXT:PRINT@395,"BY ERI
C TUCKER";:SCREEN0,1:FORT=1TO200
0:NEXT
160 SOUND200,4:POKE65495,0:PMODE
3:PCLS2:MD=0
170 DRAW"BM0,50;C4;F10D15R15U30E
10C3U10R5D1R3D1L8D8C4F10D30R15U1
5E10F10D65L80U75":PAINT(6,60),4,
4
180 DRAW"C1":LINE(0,126)-(86,191
),PSET,BF:LINE(144,126)-(255,191
),PSET,BF:DRAW"C3":LINE(88,130)-
(142,191),PSET,BF:LINE(0,160)-(2
55,191),PSET,BF
190 DRAW"C4":LINE(192,125)-(194,
120),PSET,BF
200 LINE(82,126)-(82,66),PSET
210 SCREEN1,0:FORT=1TO2000:NEXT:
X=82:Y=66
220 FORT=0TO14:DRAW"C4":LINE(82,
66)-(X,Y),PSET:LINE(82,126)-(X,Y
),PSET:SOUND245,1:FORZ=1TO200:NE
XT:DRAW"C2":LINE-(82,126),PSET:X
=X+4:Y=Y+4:NEXTT
230 DRAW"C3":LINE(82,126)-(X,Y),
PSET:LINE-(82,66),PSET:PLAY"T6L1
6V30O1CCCV25CCCV20CCCV15CCCV10CC
CV5CCC"
240 FORT=1TO1000:NEXT
250 X=192:Y=125:FORT=1TO56:DRAW"
C3":LINE(82,66)-(142,126),PSET:L
INE(X,Y)-(X+2,Y-5),PSET,BF:FORQ=
1TO30:NEXT:PLAY"L32T20V30O1DBV20
DBV10DB":DRAW"C2":LINE(X,Y)-(X+2
,Y-5),PSET,BF:X=X-2:NEXT
260 FORT=1TO1500:NEXT
270 SOUND100,1
280 CLS:PRINT@107,"VACUUM ROOM":
PRINT@198,"PICK UP THE GOLD BAR"
:PRINT@330,"YOUR SCORE:";SC:PRIN
T@362,"MEN LEFT:";3-MD
290 FORT=1TO3500:NEXT
300 REM vacuum room
310 PCLS:DRAW"C4BM100,0;G40R152H
40;BM100,191;H40R152G40":PAINT(1
10,5),4,4:PAINT(100,185),4,4:DRA
W"C2BM10,100E8R15F8L31"
320 PAINT(15,98),2,2
330 DRAW"C4":LINE(0,40)-(255,40)
,PSET:LINE(0,151)-(255,151),PSET
340 DRAW"C3":LINE(252,86)-(255,1
06),PSET,BF
350 PX=200:PY=96:PUT(PX,PY)-(PX+
10,PY+12),MAN,PSET
360 SCREEN1,0:POKE65314,248:FORT
=1TO500:NEXT
370 PLAY"T3O2L32V5GBGBGV10BGBGBV
15GBGBGV20BGBGBV25GBGBGV30BGBGB"
:CT=0:GD=0
380 GOSUB 1140
385 IF PX<=42THENPX=42
390 PLAY"T200V10L64O2CD"
400 IF PX>56 AND PX<202 THEN SC=
SC+5
430 QW=RND(10):IF QW<8 AND PX=60
 THEN PX=60:IFPY<96THENDRAW"BM58
,45;C4;D51;L2U51C1;D51R2U51;" EL
SE DRAW"BM58,96;C4;D51L2U51;C1;D
```

Now Create Your Own Signs, Banners, and Greeting Cards.

Introducing The Coco Graphics Designer

Last Christmas we introduced our COCO Greeting Card Designer program (see review April 86 Rainbow). It has been so popular that we've now expanded it into a new program called the COCO Graphics Designer. The Coco Graphics Designer produces greeting cards plus banners and signs. This program will further increase the usefullness and enjoyment of your dot matrix printer.

The Coco Graphics Designer allows you to mix text and pictures in all your creations. The program features picture, border, and character font editors, so that you can modify or expand the already built in libraries. Plus a special "grabber" utility is included to capture areas of high resolution screens for your picture library.

Requirements: a Coco or Coco II with a minimum of 32K, One Disk Drive (Disk Ext. BASIC 1.0/1.1,ADOS, or JDOS). Printers supported include: Epson RX/FX, GEMINI 10X, SG-10, NX-10, C-Itoh 8510, DMP-100/ 105/ 400/ 430, Seikosha GP-100/250, Legend 808 and Gorilla Bannana. Send a SASE for complete list of compatible printers.
#C332 Coco Graphics Designer $29.95

Over 100 More Pictures

An optional supplementary library diskette containing over one hundred additional pictures is available.
#C333 Picture Disk #1 $14.95.

Colored Paper Packs

Now available are packs containing 120 sheets of tractor-feed paper and 42 matching envelopes in assorted bright RED, GREEN, and BLUE. Perfect for making your productions unforgettable.
#C274 Paper Pack $19.95

GARAGE SALE
SAT & SUN
APRIL 12-13
34 HILLTOP LANE
GREENLAWN
COMPUTER FAIR
JULY 24
GET YOUR TICKETS TODAY!
DANGER
DO NOT ENTER
HAPPY
MOON UNIT
CALLING
THIN MUFFIN
COME IN...
THE GREETING CARD DESIGNER
LETS GO SAILING

With Zebra's Coco Graphics Designer it's easy and enjoyable making your own greeting cards, signs, and banners.

WICO TRACKBALL
Now $19.95
Order Cat#TBRS01
(Was $69.95)

TOP
WICO
COMMAND CONTROL

You can benefit from our purchase of brand new WICO Trackball Controllers at closeout prices. This model was designed specifically for the Radio Shack Color Computer and plugs right into the joystick port.

WICO is the largest designer and manufacturer of control devices for commercial arcade video games. If you've ever played an arcade video game, chances are you've used a WICO joystick or trackball and experienced its superior control, pinpoint firing accuracy, and exceptional durability.

Includes one-year limited warranty. Phoenolic ball offers 360-degree movement. Two optical encoders provide split-second response. Quick-action fire button for smooth, two handed arcade response and feel. Long 5' computer connection. Heavy duty plastic case for long hard use. Compatible with all color computer models.

We have bargain priced trackballs for ATARI, Commodore, TI, and other computers. Call or write for our price list.

Ordering Instructions: All orders add $3.00 Shipping & Handling. UPS COD add $3.00. VISA/MC Accepted. NY residents add sales tax.

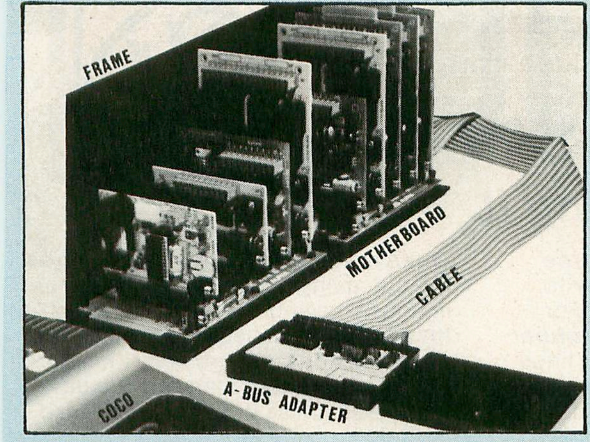
Zebra Sytems, Inc
78-06 Jamaica Ave.
Woodhaven, NY 11421
(718) 296-2385

```
51R2U51"
431 IF QW<8 AND PX=60 THEN PX=86
:PY=PY+1:PUT(PX,PY)-(PX+10,PY+12
),MAN,PSET:LINE(60,PY)-(70,PY+12
),PRESET,BF:PLAY"T50L32V31O4CDV2
1CDV11CD"
440 PUT(PX,PY)-(PX+10,PY+12),MAN
,PSET:IF PY+4>96 THEN 460
450 IF PX<202 AND PX>56 AND PY+4
<96 THEN PY=PY-(RND(4)-1)
460 IF PX<202 AND PX>56 AND PY+4
>96 THEN PY=PY+(RND(4)-1)
470 IF PY<=42 OR PY>=138 THEN GO
SUB1080:IFMD<3THEN280
480 IF PX>41 AND PX<47 AND PY>=8
5 AND PY<=100 AND GD=0 THEN PAIN
T(15,98),1,1:PLAY"V31T5L32CDEFGA
B":GD=1:SC=SC+250
490 IF GD=1 AND PX>=240 THEN PLA
Y"T6L32V30O4BBBV25BBBV20BBBV15BB
BV10BBBV5BBB":GOTO510
500 GOTO 380
510 REM open pit room
520 FORT=1TO1500:NEXT:SOUND100,1
530 CLS:PRINT@104,"MAGIC PIT ROO
M":PRINT@197,"PICK UP THE GOLD B
ARS":PRINT@330,"YOUR SCORE:";SC:
PRINT@362,"MEN LEFT:";3-MD:FORT=
1TO3500:NEXT:FORT=1TO5:GD(T)=0:N
EXT:XY=0:BZ=0
540 GX(1)=80:GY(1)=40:GX(2)=80:G
Y(2)=150:GX(3)=140:GY(3)=96:GX(4
)=212:GY(4)=60:GX(5)=212:GY(5)=1
30
550 PCLS:FORT=1TO5:DRAW"BM"+STR$
(GX(T))+","+STR$(GY(T))+";C2E4R6
F4L14":PAINT(GX(T)+2,GY(T)-1),2,
2:NEXT
560 DRAW"C3":LINE(0,86)-(4,100),
PSET,BF
570 HX(1)=60:HY(1)=84:HX(2)=132:
HY(2)=10:HX(3)=132:HY(3)=150:HX(
4)=192:HY(4)=80:SCREEN1,0:POKE65
314,248:PX=12:PY=92:HX(5)=40:HY(
5)=15:HX(6)=40:HY(6)=146:HX(7)=1
32:HY(7)=42:HX(8)=132:HY(8)=118:
HX(9)=192:HY(9)=20:HX(10)=192:HY
(10)=140
580 R=RND(10):DRAW"C4":LINE(HX(R
),HY(R))-(HX(R)+30,HY(R)+30),PSE
T,BF
590 GOSUB 1140:LINE(PX,PY)-(PX+1
0,PY+12),PRESET,BF
591 IF H<5 THEN PX=PX-2
592 IF H>59 THEN PX=PX+2
593 IF J<5 THEN PY=PY-1
594 IF J>59 THEN PY=PY+1
600 SC=SC+5
605 XY=0:FORT=1TO5:IFGD(T)=1THEN
```

The Amazing A-BUS

What will you do with it?

NEW



An A-BUS system with 2 Motherboards and 9 Cards.

SHEILA wanted to set up a variety of experiments in her lab. With an A-BUS, the computer can watch the mice instead of Sheila.

HARRY has a model railroad layout that he wished to automate. Now his home computer controls the engines, gates, signals, etc. through the A-BUS.

BOB tests electrical fixtures as they leave the assembly line. He develops test equipment quickly with inexpensive, off-the-shelf, and easy to use A-BUS cards.

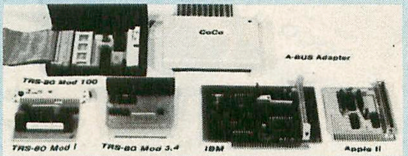
But what's an A-BUS? It's the easiest way to connect a variety of cards that sense and control anything outside the computer. With the A-BUS, your CoCo becomes an incredible machine.

What would I need? First, an *A-BUS Adapter* to convert your computer bus to the A-BUS standard. Then a *Cable* (with one or two slots) to connect one or two A-BUS Cards. If you need more than two cards, the cable will be connected instead to the *A-BUS Motherboard*, which has five slots. Up to five motherboards can be chained. Finally, add you choice of *A-BUS Cards* to fit your project.

I'm not an engineer. Can I use the A-BUS? If you can wire a switch, you can use the A-BUS. No computer hardware knowledge is needed! A screwdriver is all you need for many projects.

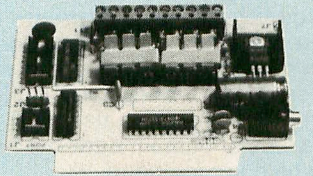
What about software? Simple PEEK and POKE commands control the whole system, whether you read the time on the clock, switch the relays, take a temperature reading, *or turn* a motor.

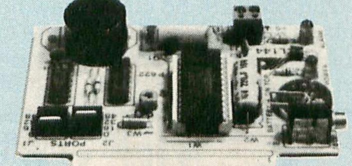
What if I change computers? Incredibly, this is as simple as replacing the inexpensive adapter card.

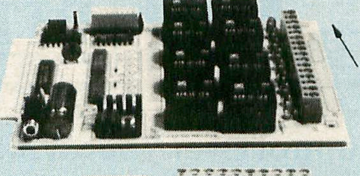


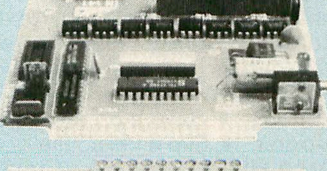
A-BUS Adapters

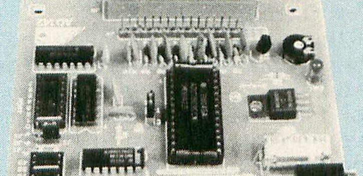
Special:
Complete set of all user's manuals.
Typeset, illustrated, with schematics.
Only$10











CoCo to A-BUS Adapter AR-138: $49

Works with all CoCo's. Plugs into rom slot or Multipak. Disk systems without Multipak need Y-cable ($19.95)

A-BUS adapter for: AApple II, II+, IIe.	AR-134...$49
IBM PC, XT, AT and all compatibles.	AR-133...$69
TRS-80 Models 100, 200.	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin I/O bus.	AR-132...$49
TRS-80 Model 4P. Includes extra cable.	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus.	AR-131...$39

A-BUS Motherboard MB-120: $99

Will accomodate five A-BUS cards. A sixth connector allows a second motherboard to be added to the first (with connecting cable CA-161...$12). Up to five motherboards can be joined this way to a single adapter. The motherboard is mounted on a sturdy aluminum frame with card guides.

A-BUS Cable (3 ft.) CA-163: $29

Connects Adapter to 1 A-BUS card or Motherboard.
Special Cable for two A-BUS cards CA-162...$39

Relay Card RE-140: $129

8 industrial relays on board. Contacts are rated at 3 amps. You can control up to 64 cards (512 relays) using several motherboards. Jumpers are used to simply select the card address. The card is easily controlled in BASIC with "OUT" or "POKE". For example, OUT 1,0 turns all the relays off on card #1. Eight LED's show which relays are on.

Digital Input Card IN-141: $49

It's safe and easy to connect and read switches, keypads, thermostats, alarm loops, etc. The eight inputs can monitor the presence of voltage or switch position. Simple INP or PEEK commands read the status (On or Off) of the inputs. Each input is optically isolated for convenience and safety.

Analog Input Card AD-142: $119

With this 8 bit, 8 channel A/D converter, your computer can read voltages, temperatures, pressures, light levels, etc. Take over 100 readings per second in BASIC (several thousand with machine language). It's simple to use, for example: OUT 1,3 selects channel #3, then A=INP(1) reads the voltage on that channel. Input range: 0 to 5.1V. Resolution: 20mV. Conversion time 120us.

Prototyping Card PR-152: $15

Protocard is 3½ by 4½ in. and accepts up to 10 IC's.

12 Bit A/D Converter AN-146: $109

This high performance analog to digital converter features accuracy to 0.025%, 130ms conversion time, sign and over range indication. The basic input range is −5 to +5 volts, with 1.2mV resolution, but the gain of the on-board amplifier can be set to measure microvolts. Ideal for a strain gauge, thermocouple, pH meter, etc.

Motor Controller ST-143: $69

Stepper Motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with stepper motors: Each controller card drives **two** stepper motors (12V, bidirectional, 4 phase).
Motor: 48 steps/revolution, 300 steps/second, ¼" shaft: MO-103...$15. Power supply: PS-126...$10
Special Package: the controller card, *two* stepper motors, and power supply: **PA-181...$99**

Clock with Alarm CL-144: $89

It's the most powerful clock/calendar available. The features: • 5 second/month accuracy. • Keeps time, date, and alarm for 5 years (even with computer off). • Can time events down to 1/100 second. • Periodic "chime". • Full time and date alarm. • Four alarm outputs: Computer, LED, Buzzer, and Reed Relay. • Easy to use,: for example H=INP(1) reads the hours, Y=INP(6) reads the year, etc.

Latest Developments

Voice Synthesizer	VS-153
15 Bit Analog to Digital Converter	AD-155
Intelligent Stepper Motor Controller	ST-154
Digital to Analog Converter	DA-147
LCD Display (one and two line)	LD-151
Touch Tone® Decoder	PH-145
Counter Timer	CT-154
24 Line TTL Input/Output	DT-148

☎ Order Line Except in NY **800 221-0916**
Info and NY orders: **(718) 296-5916**
Technical Info: **(203) 656-1806**
All lines open weekdays 9 to 5 NY time.

Add $3.00 per order for shipping.
We accept Visa, MC, checks, M.O.
C.O.D. add $3.00 extra.
N.Y. residents add sales tax.
Shipping to Canada is $5.00
Overseas, FPO, APO add 10%

COLORWARE

Colorware Inc
79-04 Jamaica Ave
Woodhaven, NY 11421

CoCo Max™ II

File Edit Goodies Font Style
LIBERTY
NEW

You'll use it all the time and love using it.

What is CoCo Max ?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.

CoCo Max disk system, with Y-cable.

Is CoCo Max for you ?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success ?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

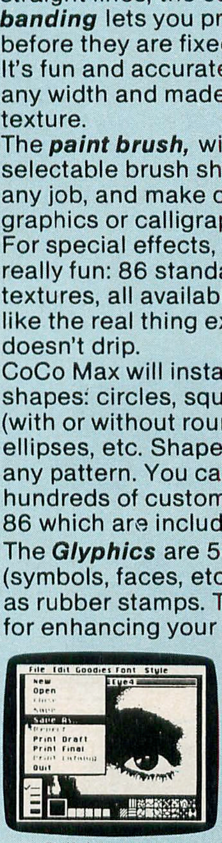
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubberbanding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

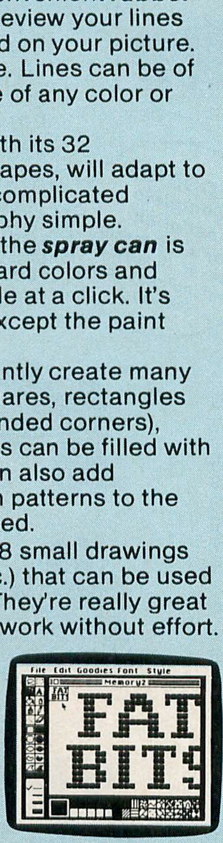
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in !

Control Over Your Work

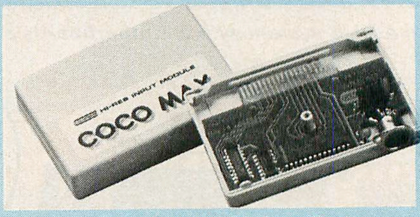
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color !

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso***.



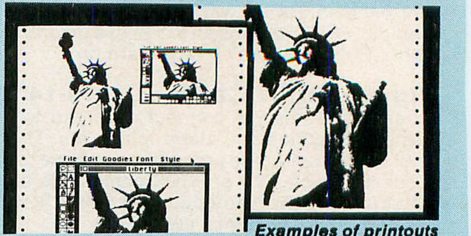
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack ?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles !



Examples of printouts

Printing Your Creations

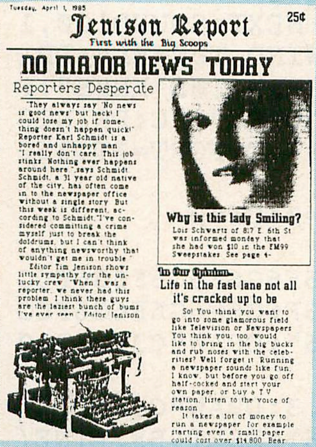
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers !

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).



Tuesday, April 1, 1985

Jenison Report 25¢

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man "I really don't care. This job stinks. Nothing ever happens around here." says Schmidt. Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story. But this week is different, according to Schmidt."I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew. "When I was a reporter, we never had this problem. I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E. 6th St was informed monday that she had won $10 in the FM99 Sweepstakes. See page 4-

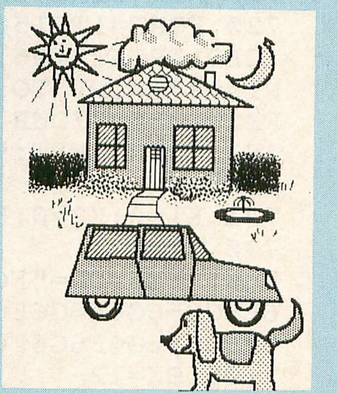
In Our Opinion...

Life in the fast lane not all it's cracked up to be

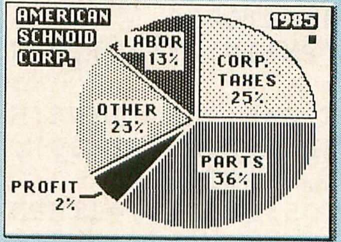
So! You think you want to go into some glamorous field like Television or Newspapers. You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it. Running a newspaper sounds like fun, I know, but before you go off half-cocked and start your own paper, or buy a T.V. station, listen to the voice of reason.

It takes a lot of money to run a newspaper. For example starting even a small paper could cost over $14,800. Bear

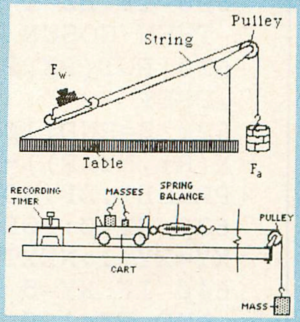
❶ *Publish a newsletter or bulletin*



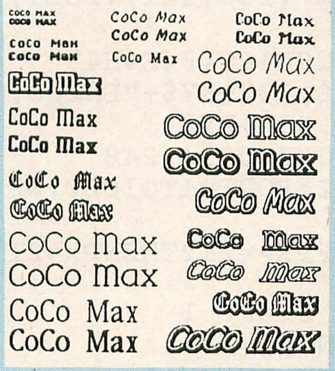
❷ *Fun for children while stimulating creativity.*



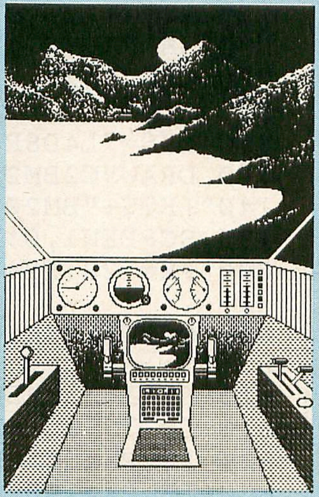
❸ *Business graphs, charts, diagrams. Also memos*



❹ *Junior's homework and science projects. Term papers too !*

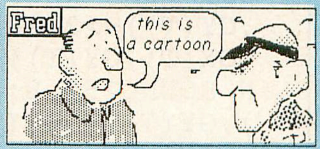


❺ *Over 200 typestyles to choose from ! generate flyers.*

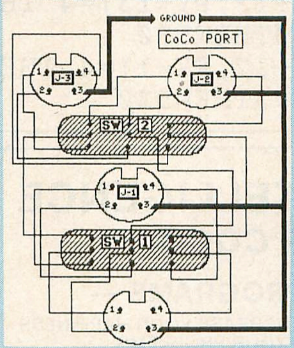


❻ *A new way to express your imagination.*

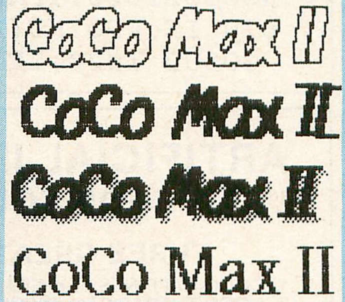
❼ *Video portrait (with optional digitizer).*



❽ *This is a cartoon.*



❾ *schematics and floor plans.*



❿ *Logos and letterheads.*

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)

Disk systems need a Multi-Pak or our Y-Cable.

CoCo Max is compatible with any Radio Shack DOS and ADOS.

Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics.* Also, it has 5 fonts instead of 14.

CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10,Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.

Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape with Hi-Res Pack and manual.	$69.95
CoCo Max II (disk only) with Hi-Res Pack and manual.	$79.95
Upgrade: CoCo Max to CoCo Max II New disk and manual. New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.	$19.95
Upgrade: CoCo Max tape to disk manuals, disk and binder	$24.95
Y-Cable: *Special Price*	$19.95
Super Picture Disks #1, #2, and #3 each:	$14.95
All three picture disks	$29.95

Guaranteed Satisfaction

Use CoCo Max for a full month. If you are not delighted with it, we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

New Low Price Save $50........ $99.95

New: faster DS-69A.......... $149.95

COLORWARE

Colorware Incorporated
79-04A Jamaica Avenue
Woodhaven, NY 11421

800 221-0916
Orders only.
NY & info: (718) 296-5916
Hours: 9-5 Eastern time.

Add $3.00 per order for shipping.
We accept Visa, MC, checks, M.O.
C.O.D. add $3.00 extra.
NY and CT : add sales tax.
Shipping to Canada is $5.00
Overseas, FPO, APO add 10%

```
XY=XY+1:NEXT:IF BZ=0 AND XY=5 AN
D PX<=64 AND PX>35 AND RND(90)<=
2 THEN DRAW"S2C3BM140,96L4D8R4U8
D16G4F4E4H4S4":KX=140:KY=96:BZ=1
:SOUND1,1
606 IF BZ=1 AND PPOINT(KX,KY)<>3
 THEN GOSUB 5000:GOTO550
610 PUT(PX,PY)-(PX+10,PY+12),MAN
,PSET
620 Z=RND(10):IF Z<6 THEN LINE(H
X(R),HY(R))-(HX(R)+30,HY(R)+30),
PRESET,BF:SOUND1,1:GOTO580
630 XY=0:FORT=1TO5:IFGD(T)=1THEN
XY=XY+1:NEXTELSENEXT
640 IF XY=5 AND PX<=12 AND PY>85
 AND PY<100 THEN PLAY"T6L32V30O4
BBBV25BBBV20BBBV15BBBV10BBBV5BBB
":GOTO710
650 FORT=1TO5:IF PPOINT(GX(T)+12
,GY(T))<>2 AND GD(T)=0 OR PPOINT
(GX(T),GY(T))<>2 AND GD(T)=0 THE
N SOUND250,8:SC=SC+250:LINE(GX(T
),GY(T))-(GX(T)+14,GY(T)-5),PRES
ET,BF:GD(T)=1:NEXT ELSE NEXT
660 IF PPOINT(PX+12,PY+13)=4 THE
NGOSUB1020:IFMD<3THEN530
670 IF PPOINT(PX+12,PY-1)=4 THEN
 GOSUB 1020:IFMD<3THEN530
680 IF PPOINT(PX-2,PY-1)=4 THEN
GOSUB1020:IFMD<3THEN530
690 IF PPOINT(PX-2,PY+13)=4 THEN
 GOSUB1020:IFMD<3THEN530
700 GOTO 590
710 REM wind tunnel
720 FORT=1TO1500:NEXT:SOUND100,1
:CLS:PRINT@106,"WIND TUNNEL":PRI
NT@197,"TRY TO REACH THE KEYS":P
RINT@330,"YOUR SCORE:";SC:PRINT@
362,"MEN LEFT:";3-MD:FORT=1TO350
0:NEXT
721 K1=0:K2=0:K3=0:CT=0
730 CT=0
740 PCLS:D$="F6G6F6G6F6G6F6G6F6G
6F6G6F6G6F6G6F6G6F6G6F6G6F6G6F6G
6F6G6F6G6F6G6F6G6":DRAW"C3BM12,0
"+D$:DX=12
750 PAINT(1,5),3,3:DRAW"C4":LINE
(255,76)-(240,116),PSET,BF:LINE(
255,94)-(225,98),PSET,BF:DRAW"U2
U8D16H8E8":PAINT(223,96),4,4
760 LINE(228,10)-(230,181),PSET,
BF
770 KY$="L4D8R4U8D16G4F4E4H4"
780 DRAW"C2BM208,30"+KY$+"BM208,
140"+KY$+"BM208,85"+KY$
790 SCREEN1,0:POKE65314,248
800 PX=128:PY=92:FORT=1TO1000:NE
XT
810 GOSUB1140:IFPX>=212THENPX=21
2
815 IF J<5 THEN PY=PY-1
816 IF J>59 THEN PY=PY+1
820 IF PX<60 THEN PX=PX+1
830 IF PX>190 THEN PX=PX-1
840 SC=SC+5
850 CT=CT+1:IF CT/5=INT(CT/5) TH
EN DRAW"C3BM"+STR$(DX)+",0"+D$:D
X=DX+2
860 PX=PX-(RND(3)-1):PLAY"T200V2
0L64O1CCC"
870 PUT(PX,PY)-(PX+10,PY+12),MAN
,PSET
880 IF PPOINT(PX-2,PY)=3 OR PPOI
NT(PX-2,PY+12)=3 THEN GOSUB 1080
:IFMD<3THEN710
890 DRAW"BM228,10C3D171R1U171C4L
1D171R1U171L1"
900 IF PPOINT(PX+12,PY+13)=2 AND
 PY<45 AND PY>30 AND K1=0 OR PPO
INT(PX+12,PY)=2 AND PY<45 AND PY
>30 AND K1=0 THEN DRAW"C1BM208,3
0"+KY$:SOUND240,4:K1=1:SC=SC+250
910 IF PPOINT(PX+12,PY+13)=2 AND
 PY<155 AND PY>140 AND K3=0 OR P
POINT(PX+12,PY)=2 AND PY<155 AND
 PY>140 AND K3=0 THEN DRAW"C1BM2
08,140"+KY$:SOUND240,4:K3=1:SC=S
```

ARTIFICIAL INTELLIGENCE FOR YOUR COCO

THREE GREAT PROGRAMS —

1. COCO HAPPINESS EXPERT — INCREASE YOUR HAPPINESS
2. COCO THERAPIST — DISCUSS YOUR PROBLEMS
3. COCO POET — ENDLESS STIMULATING POETRY

NEW! AI Pack I $24.95

(SPECIFY TAPE OR DISK)
(AND LEARN YOUR HAPPINESS QUOTIENT)
COMPLETE DOCUMENTATION INCLUDES "THE HISTORY OF AI"

COCO JOKESTER

JUST TELL HIM YOUR NAME AND HE'LL TALK YOUR EAR OFF
$26.95 (DISK ONLY)

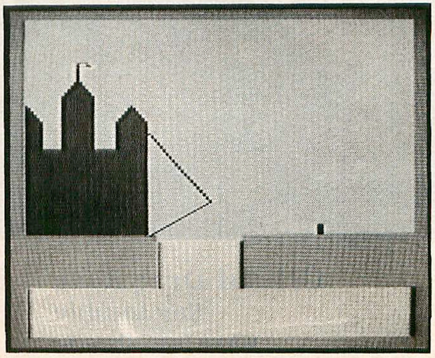
Now Available
COCO EXPERT SYSTEM TOOLKIT
BUILD YOUR OWN EXPERT SYSTEM
USING SIMPLE MENU COMMANDS.
— DEMOS, TUTORIAL, EXPERT SYSTEM SHELL, CLEARLY WRITTEN KNOWLEDGE ENGINEERING MANUAL
— CREATE YOUR OWN KNOWLEDGEBASE
— $59.95 * DISK ONLY * 64K REQUIRED
INCLUDED: TWO FREE EXPERT SYSTEMS
— STOCK MARKET EXPERT
— EXECUTIVE HEALTH EXPERT

THINKING SOFTWARE, INC.
46-16 65 PLACE
WOODSIDE, N.Y. 11377
(718) 429-4922

RAINBOW CERTIFICATION SEAL

CALL RIGHT NOW FOR FREE CATALOG
Talking version of all software available
RS Speechpak required / Add $5.00 per disk

```
C+250
920 IF PPOINT(PX+12,PY+13)=2 AND
 PY<100 AND PY>85 AND K2=0 OR PP
OINT(PX+12,PY)=2 AND PY<100 AND
PY>85 AND K2=0 THEN DRAW"C1BM208
,85"+KY$:SOUND240,4:K2=1:SC=SC+2
50
930 IF K1=1 AND K2=1 AND K3=1 TH
EN 950
940 GOTO 810
950 REM cleared all boards
960 SOUND200,5:SOUND225,10
970 FORT=1TO2000:NEXT
980 CLS:PRINT@128,"  CONGRATULAT
IONS! YOU HAVE":PRINT"  COMPLETE
D THE THREE ROUNDS!"
990 SC=SC+1000:PRINT@320,"    YO
UR SCORE:";SC:SCREEN0,1
1000 SOUND200,5:FORT=1TO2000:NEX
T
1010 GOTO 260
1020 REM pitfall
1040 CLS0:PRINT@480,STRING$(31,2
07);:PRINT@15,CHR$(175);:Z=0
1060 FORT=15TO1STEP-1:PRINT@Z+15
,CHR$(175);:SOUNDT,1:PRINT@Z+15,
CHR$(128);:Z=Z+32:NEXT
1070 PRINT@396,CHR$(163);:PRINT@
403,CHR$(166);:PRINT@461,CHR$(16
8);:PRINT@463,CHR$(162);:PLAY"T6
L16V30O2CCCV25CCCV20CCCV15CCCV10
CCCV5CCC":FORT=1TO1500:NEXT:SCRE
EN1,0:POKE65314,248:GOSUB1080:RE
TURN
1080 FORT=1TO20:PUT(PX,PY)-(PX+1
0,PY+12),MAN,PRESET:SOUND250,1:P
UT(PX,PY)-(PX+10,PY+12),MAN,PSET
:NEXT
1090 MD=MD+1:IF MD<3 THEN RETURN
1100 PLAY"O1V25T3L2BL2.C"
1110 FORT=1TO2000:NEXT:CLS:PRINT
@64," T R E A S U R E   Q U E S
T":PRINT@192,"       YOUR SCORE:"
;SC:IF SC>HS THEN HS=SC:PRINT@22
4,"      HIGH SCORE:";HS ELSE PR
INT@224,"       HIGH SCORE:";HS
1115 PRINT@128,"       G A M E
O V E R"
1120 PRINT@288,"";:INPUT"ANOTHER
 GAME";I$
1130 IF LEFT$(I$,1)="Y"THENSC=0:
GOTO160 ELSE POKE65494,0:END
```



```
1140 H=JOYSTK(0):J=JOYSTK(1)
1150 IF H<5 THEN PX=PX-2
1160 IF PX<=8THENPX=8
1170 IF H>58 THEN PX=PX+2
1180 IF PX>=242THENPX=242
1190 IF J<5 THEN PY=PY-1
1200 IF PY<=8THENPY=8
1210 IF J>58 THEN PY=PY+1
1220 IF PY>=174THENPY=174
1230 RETURN
5000 PLAY"T3L32O4V5CDEFGABAGFEDC
V10CDEFGABAGFEDCV15CDEFGABAGFEDC
V20CDEFGABAGFEDCV25CDEFGABAGFEDC
V30CDEFGABAGFEDC"
5010 FORT=1TO1000:NEXT:CLS:PRINT
@128,"   CONGRATULATIONS! YOU PI
CKED":PRINT"        UP AN EXTRA M
AN!"
5020 PRINT@224,"MEN LEFT:";3-MD:
MD=MD-1:FORT=1TO2000:NEXT:PRINT@
224,"MEN LEFT:";3-MD:SOUND1,1:FO
RT=1TO1500:NEXT:SCREEN1,0:SC=SC+
100:BZ=0:FORT=1TO5:GD(T)=0:NEXT:
RETURN
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

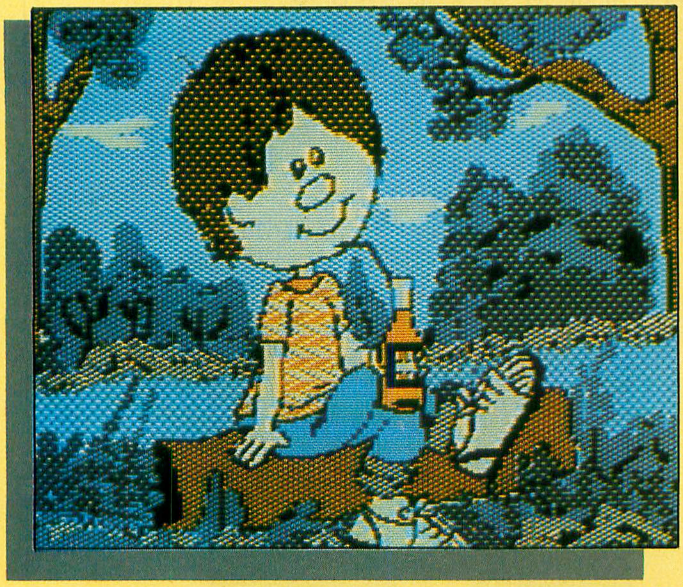
Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

The CoCo Gallery



1st PRIZE

Summer

Clay Ambrose

Bloomington, CA

Taking the gallery back a few months, Clay used *CoCo Max* and *CoCo Paint* to remind us of how wonderful, carefree and relaxing summertime can be.

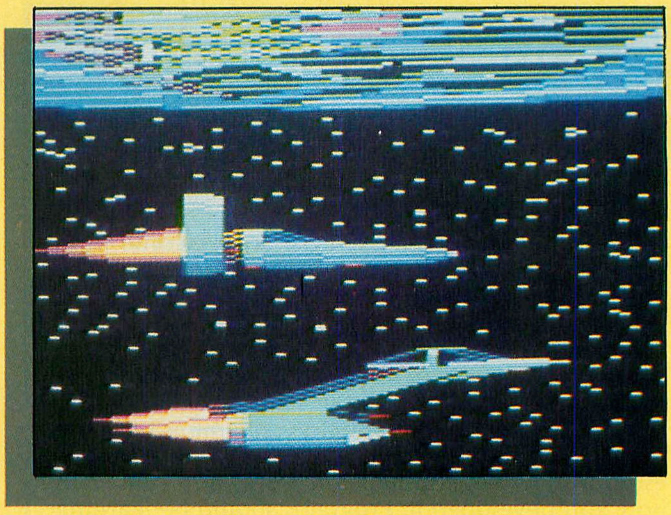
2nd PRIZE

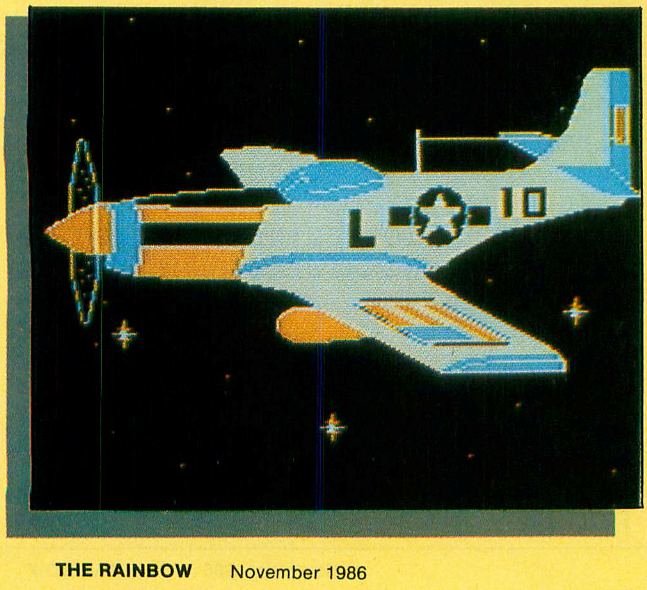
Orbital Drag Race

Ray Larabie

White Lake, Ontario

Ray gives us his rendition of galactic entertainment, which was created with BASIC and a program Ray devised himself. Ray is 16 years old and lives along the lower part of the Madawaska River.





3rd PRIZE

P51 Mustang

Anthony Harvey

LaTuque, Quebec

Soaring into the pages of THE RAINBOW, this memorable fighter plane was created with BASIC and the enduring patience of Anthony, who is 13 years old.

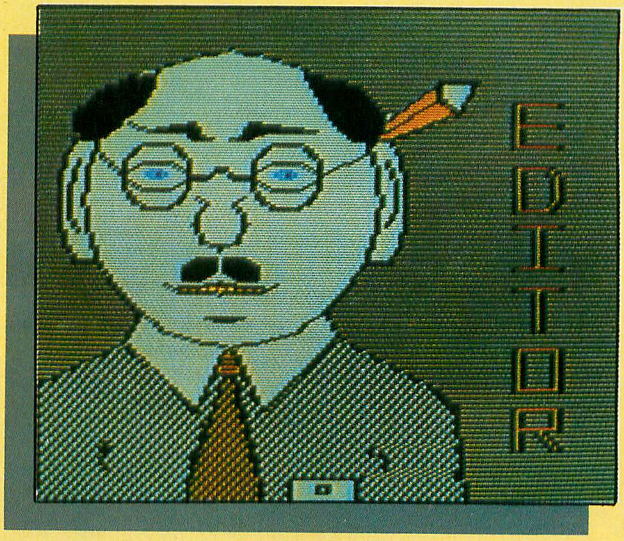
Editor

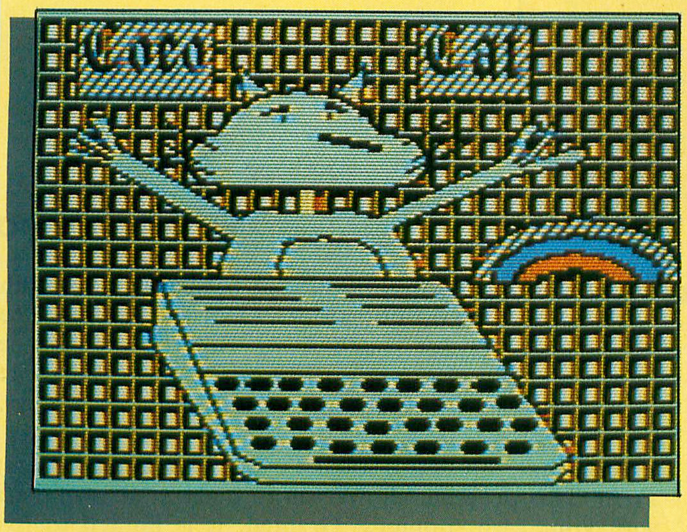
Woody Pope

Garland, TX

HONORABLE MENTION

Woody used BASIC to create this amusing graphic which really hits home with all of us here at THE RAINBOW.





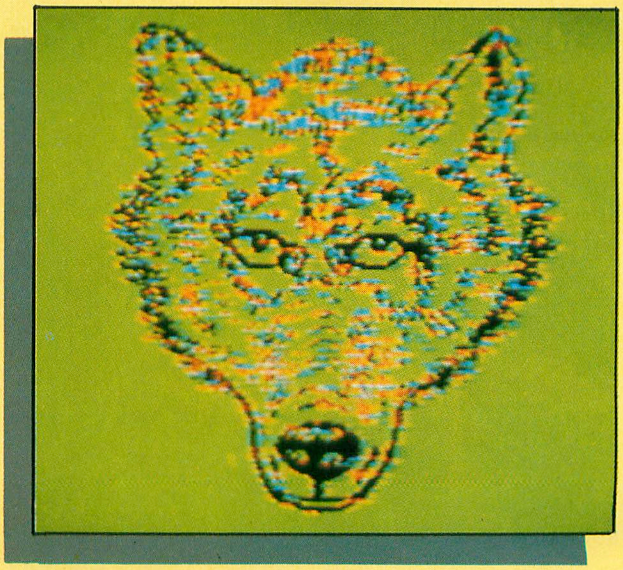
CoCo Cat

Mark Bourdeaux

Spring Arbor, MI

HONORABLE MENTION

Mark, who is 13 years old and a freshman at Western High School, graces the CoCo Community this month with this well-known comic figure that was created using *CoCo Max*.



Wolf

Robin Moulder

Stone Mountain, GA

HONORABLE MENTION

Robin created the face of this canine predator with the use of BASIC. Robin works part time at Radio Shack and is a full-time student at Devry Institute of Technology for Electronics Engineering Technology.

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in pcoming showings of "CoCo Gallery." Share your creaions with the CoCo Community!

Be sure to send a cover letter with your name, address and hone number, detailing how you created your picture (what rograms you used, etc.) and how to display it. Also, please nclude a few facts about yourself.

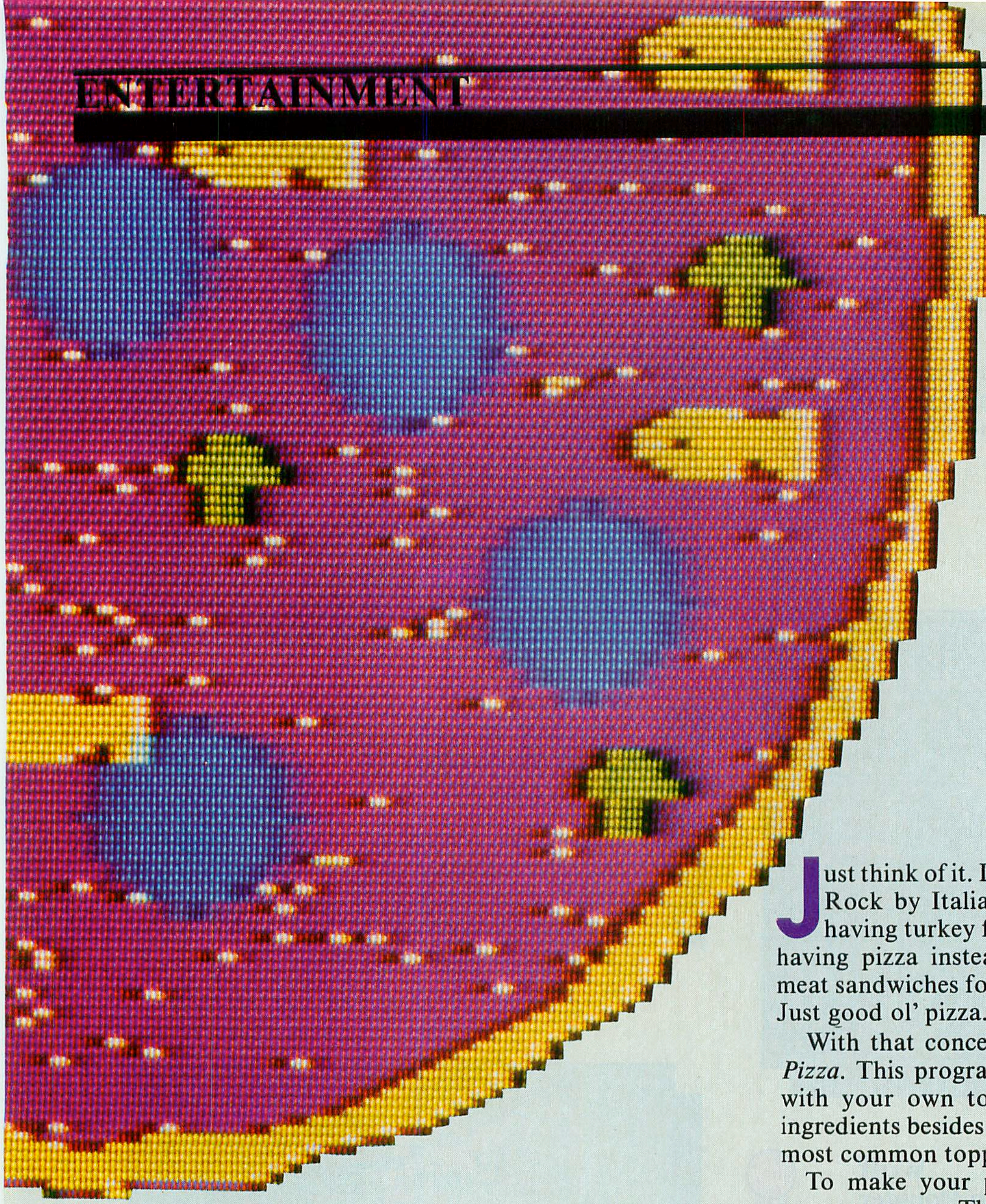
Don't send us anything owned by someone else; this neans no game screens, digitized images from TV programs r material that's already been submitted elsewhere. A igitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Jody Doyle, Curator

Send your entry on either tape or disk to:

CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Jody Doyle



A Thanksgiving Pizza Party

If the Pilgrims had met Italians instead of Indians . . .

By Bill Bernico

Just think of it. If the Pilgrims had been met at Plymouth Rock by Italians instead of Indians, we wouldn't be having turkey for Thanksgiving. No, we'd probably be having pizza instead. Imagine, no drumsticks, no white meat sandwiches for a week afterward, no worried turkeys. Just good ol' pizza.

With that concept in mind I'd like to present *Holiday Pizza*. This program allows you to make your own pizza with your own toppings. Granted, it is limited to five ingredients besides the dough and sauce, but they're the five most common toppings available.

To make your pizza you need one key ingredient — common sense. The toppings are listed on the left side of the screen and by pressing the first letter of that topping it is added to your pizza. Like I said, first comes the common sense. You could start with any of the toppings but when you make a real pizza you start with the dough and sauce. Same goes here. If you start with anchovies, for example, the sauce covers them up and you won't be able to see them, so start with the dough and the sauce. Then you can add the rest in any order.

Most ingredients are added immediately. Have patience with the Cheese and Extra Cheese options, though. They take about 40 seconds to complete. As each topping is added, its name is deleted from the list. When the name disappears, you know the topping is added.

When you have the pizza made up the way you like it, press 'F' for finished and the pizza will be carved by the head of the house, just like a turkey. To try the program again, simply press the space bar.

(Questions about this program may be directed to Mr. Bernico at 708 Michigan Ave., Sheboygan, WI 53081. Please enclose an SASE for a reply.) □

Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.

```
12 .......130
27 .......139
34 .......141
END ......95
```

The listing: PIZZA

```
1 'HOLIDAY PIZZA
2 'FROM KROMICO SOFTWARE
3 'BY BILL BERNICO
4 '
5 CLEAR500:DIM A$(88):GOTO38
6 PMODE3,1:PCLS:SCREEN1,0
7 P$="L2ND2L2G2NF2G2D3NR2D3F2NE2
F2R2NU2R2":M$="ND3U5RD8RU8FD3RU2
FDNRL8UED2RU3":F$="R6BR6R2DL3BL3
L10GR17DL12BL3L3FR17DL3BL4L9RFR6
BR6R2":CIRCLE(158,96),96
8 A$="DOUGH":DRAW"C3BM0,9":GOSUB
35:A$="TOMATO SAUCE":DRAW"BM0,24
":GOSUB35:A$="MUSHROOMS":DRAW"BM
0,39":GOSUB35:A$="ANCHOVIES":DRA
W"BM0,54":GOSUB35:A$="CHEESE":DR
AW"BM0,69":GOSUB35:A$="PEPPERS":
DRAW"BM0,84":GOSUB35
9 A$="SAUSAGE":DRAW"BM0,99":GOSU
B35:A$="EXTRA":DRAW"BM0,114":GOS
UB35:A$="CHEESE":DRAW"BM8,122":G
OSUB35:A$="FINISHED":DRAW"BM0,15
0":GOSUB35
10 C$=INKEY$:IFC$=""THEN10
11 IFC$="D"THENPAINT(158,3),2,4:
LINE(0,0)-(60,16),PRESET,BF
12 IFC$="T"THENCIRCLE(158,96),90
,4:PAINT(158,9),4,4:LINE(0,16)-(
90,30),PRESET,BF
13 IFC$="C"THENGOSUB21:LINE(0,60
)-(60,72),PRESET,BF
14 IFC$="A"THENGOSUB27
15 IFC$="M"THENGOSUB29
16 IFC$="P"THENGOSUB31
17 IFC$="S"THENGOSUB33
18 IFC$="E"THENGOSUB21:LINE(0,10
2)-(60,126),PRESET,BF
19 IFC$="F"THEN40
20 GOTO 10
21 FORC=1TO500:X=70+RND(177):Y=1
0+RND(190):PSET(X,Y,2)
22 IFPPOINT(X+1,Y)=1THENPRESET(X
,Y)
23 IFPPOINT(X-1,Y)=1THENPRESET(X
,Y)
24 IFPPOINT(X,Y+1)=1THENPRESET(X
,Y)
25 IFPPOINT(X,Y-1)=1THENPRESET(X
,Y)
26 NEXTC:RETURN
27 E=130:F=25:GOSUB28:E=197:F=29
:GOSUB28:E=220:F=73:GOSUB28:E=17
0:F=83:GOSUB28:E=108:F=101:GOSUB
28:E=149:F=140:GOSUB28:E=220:F=1
11:GOSUB28:LINE(0,48)-(65,60),PR
ESET,BF:GOTO10
28 DRAW"C2BM=E;,=F;"+F$:DRAW"C4"
:RETURN
29 C=190:D=58:GOSUB30:C=140:D=70
:GOSUB30:C=226:D=99:GOSUB30:C=17
1:D=119:GOSUB30:C=215:D=150:GOSU
B30:C=104:D=145:GOSUB30:C=86:D=7
6:GOSUB30:LINE(0,32)-(70,43),PRE
SET,BF:GOTO10
30 DRAW"C1BM=C;,=D;"+M$:RETURN
31 H=90:V=122:GOSUB32:H=210:V=80
:GOSUB32:H=181:V=132:GOSUB32:H=1
19:V=40:GOSUB32:H=176:V=30:GOSUB
32:H=135:V=159:GOSUB32:H=150:V=1
00:GOSUB32:LINE(0,70)-(60,86),PR
ESET,BF
32 DRAW"C1BM=H;,=V;"+P$:RETURN
33 A=158:B=96:GOSUB34:A=148:B=40
:GOSUB34:A=168:B=152:GOSUB34:A=1
13:B=80:GOSUB34:A=120:B=133:GOSU
B34:A=190:B=103:GOSUB34:A=210:B=
130:GOSUB34:A=205:B=60:GOSUB34:L
INE(0,86)-(60,99),PRESET,BF:GOTO
10
34 CIRCLE(A,B),10,3:PAINT(A,B),3
,3:RETURN
35 FORX=1TOLEN(A$):Y=ASC(MID$(A$
,X,1))
36 IFY<0THENY=0
37 DRAWA$(Y):NEXT:RETURN
38 A$(32)="BR4":A$(65)="U6R4D3NL
4D3BR4":A$(67)="NR4U6R4BD6BR4":A
$(68)="RU6LR3FD4GL2BR7":A$(69)="
NR4U3NR4U3R4BD6BR4":A$(70)="U3NR
4U3R4BD6BR4":A$(71)="BU6NR5D6R5U
3L2BD3BR6":A$(72)="U6D3R4U3D6BR4
":A$(73)="BRNU6BR4":A$(77)="U6F2
E2D6BR4":A$(78)="U6DF4U5D6BR
39 A$(79)="R4L4U6R4D6BR4":A$(80)
="U6R4D3L3D3BR7":A$(82)="U6R4D3L
4RF3BR4":A$(83)="R4U3L4U3R4BD6BR
4":A$(84)="BU6R4L2D6BR6":A$(85)=
"U6D6R4U6D6BR4":A$(86)="BU6D4F2E
2U4BD6BR4":A$(88)="UE2H2UDF2E2UD
G2F2DBR4":GOTO6
40 DRAW"BM158,96C1NU96ND96NR96NL
96NE80NF80NG80NH80
41 IFINKEY$<>CHR$(32)THEN41ELSER
UN
```

The Third One's the Charm

New commands and features of the CoCo 3

By Mark Siegel

Here we are at the start of a new era in the saga of the Color Computer. The Color Computers 1 and 2 have been great machines. The proof of this is their longevity and popularity. With the introduction of the Tandy Color Computer 3, a new age dawns for the home computer. This new computer can produce startling graphics and run many programs at the same time, and allows for a better human-to-computer interface. Of course, the best part is that it's priced so everyone can afford to buy one.

Let's get down to the facts and figures. First, the Color Computer 3 comes with 128K of RAM and can be expanded to 512K. The graphics *capabilities* are 640 by 225, although only a maximum of 640 by 192 is supported. Up to 16 colors can be displayed on the screen at the same time, and there are 64 different colors to choose from. Both 40-by-24 and 80-by-24 character screens are supported. In addition, these screens have attributes, eight foreground and eight background colors, underlining and blinking. The hardware is capable of displaying more lines of text. Keep in mind, however, most TV sets cannot display these extra lines. The Color Computer 3 can run at .89 MHz, like its predecessors. A new 1.79 MHz clock rate is provided. This additional speed allows the Color Computer 3 to outrun most of the PC compatibles, and all of its competition in this price range.

The 6809 CPU has a 16-bit program counter, which means it can only address 64K at any one time. Yet, the Color Computer 3 can have 512K of RAM in it, and the 6809 can execute a program from all the RAM. This is done with a device called an MMU (Memory Management Unit). The MMU is also referred to as a DAT (Dynamic Address Translator). Sounds pretty fancy. Well, it's really quite simple. There are two sets of eight-DAT registers, one for a system mode and one for a user mode.

A memory address has a 16-bit binary value. Each bit, starting with the most significant bit, selects either the upper or lower section of memory. For example, if the highest bit in the 16-bit address is on, the processor will only select memory in the upper 32K of address space. The three most significant bits break memory into 8K blocks throughout the map. These three bits

---

Mark Siegel is the product manager of Color Computer and home entertainment products for Tandy Corporation.

XTEAM & OS-9

BOTH WINNERS

XTERM

OS-9 Communications program.

- Menu oriented
- Upload/download. Ascii or XMODEM protocol
- Execute OS-9 commands from within XTERM
- Definable macro keys
- Works with standard serial port, RS232 PAK, or PBJ 2SP Pack, Includes all drivers.
- Works with standard screen. XSCREEN, or WORDPAK 80 column board.

$49.95 with source **$89.95**

XMENU

Creates a menu driven environment for OS-9.

- Create your own menus
- Works with standard screen, XSCREEN, WORDPAK, O-PAK

$29.95 with source **$59.95**

XSCREEN

OS-9 hi-res screen

- 51/64/85 chars per line
- Easy menu operation

$19.95 with source **$39.95**

XDIR & XCAL

Hierarchial directory
- Full sorting
- Complete pattern matching

OS-9 calculator
- Decimal, Hex, Binary
- +, -, *, /, AND,OR, XOR, NOT

$24.95 with source **$49.95**

XDIS

OS-9 disassembler

$34.95 with source **$54.95**

XWORD

OS-9 word processing system

- Works with standard text screen, XSCREEN, WORDPAK, or O-PAK
- True character oriented full screen editing
- Full block commands
- Find and Replace commands
- Execute OS-9 commands from within
- Proportional spacing supported
- Full printer control, character size, emphasized, italics, overstrike, underline, super/sub-scripts
- 10 header/footers
- Page numbering in decimal or Roman numerals
- Margins and headers can be set different for even and odd pages

$69.95 with source **$124.95**

XMERGE

Mail merge capabilities for XWORD

$24.95 with source **$49.95**

XSPELL

OS-9 spelling checker, with 20000 and 40000 word dictionaries

$39.95

XTRIO

XWORD/XMERGE/XSPELL

$114.95 with XWORD/XMERGE source **$199.95**

XED

OS-9 full screen editor

$39.95 with source **$79.95**

AND FOR RS DOS ...

SMALL BUSINESS ACCOUNTING

This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List. **$79.95**

INVENTORY CONTROL/SALES ANALYSIS

This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter / update salesman records, and update the SBAP inventory. **$59.95**

PAYROLL

Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

These programs are user friendly and menu driven. Sample transactions are included. Each package features a hi-res screen. Each requires a printer, a minimum of 32k and at least 1 disk drive.

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package. **$59.95**

ACCOUNTS PAYABLE

Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package. **$59.95**

MICROTECH
CONSULTANTS
INC. 1906 Jerrold Avenue
St. Paul, MN 55112

Dealer Inquiries Invited
Author Submissions accepted
OS-9 is a trademark of Microware

Ordering Information

VISA
MasterCard

Add $3.00 shipping & handling, MN residents add 6% sales tax.
Visa, Mastercard, COD (add $2.50), personal checks.

(612) 633-6161

produce eight combinations. This set of combinations point to the eight DATs. Each DAT register can be made to point to an 8K block in the 512K memory map. By changing these DAT registers, the 6809 can address any location in the ½-meg address space. Having two sets of DATs allows the 6809 to switch memory maps very quickly. An operating system like OS-9 Level II changes the user's memory configuration during an interrupt, and allows for many programs and/or programs longer than 64K to run within the system.

Now that we have provided the 6809 CPU with a way to address more memory, we can look at how the superb graphics use it. First, let's look at all the graphics modes.

Compatible Modes	
64 by 32	8 color
128 by 100	4 color
128 by 192	4 color
256 by 192	2 color

New Modes	
160 by 192	16 color
320 by 192	4 color
320 by 192	16 color
640 by 192	2 color
640 by 192	4 color

Figure 1

ATTR	Displays character attribute, foreground, background, blink and underline
HBUFF	Allocates space outside of BASIC's program area for Hi-Res GET/PUT buffers
HCIRCLE	Draws a circle on Hi-Res screen
HCLS	Clears Hi-Res screen
HCOLOR	Sets foreground and background on Hi-Res screen
HDRAW	Draws an object on Hi-Res screen described by a string
HGET	Copies an area on Hi-Res screen to a buffer
HLINE	Draws a line on Hi-Res screen
HPAINT	Fills an area on Hi-Res screen
HPRINT	Displays text on Hi-Res graphics screen
HPUT	Displays a block stored in a buffer on Hi-Res screen
HRESET	Resets a point on Hi-Res screen
HSET	Sets a point on Hi-Res screen
HSCREEN	Selects Hi-Res mode for display
HSTAT	Returns character location, character and attribute
LOCATE	Positions cursor on a screen
LPOKE	Pokes a byte into any location in the 512K map
ON BRK GOTO	Causes the BREAK key to be trapped
ON ERR GOTO	Causes an error to be trapped
PALETTE	Changes color registers
WIDTH	Selects 32-, 40- or 80-column display
BUTTON	Returns status of firebutton
ERLIN	Returns the line number in which an error occurred
ERNO	Returns number of the error
HPOINT	Returns a point on Hi-Res screen
LPEEK	Peeks a location in the 512K map

Most of the games written for the Color Computer use the 128-by-192 four-color mode; this mode takes up 6K of memory. And, of those games, most use two graphics screens for a total of 12K. The 320-by-192 16-color mode uses 32K of memory for just one screen. A game that requires two screens of video uses 64K. That is the maximum amount of memory that you could have in the old Color Computer. You can write some really fine looking programs with this kind of color and resolution. However, to do a program like *Zaxxon* in this kind of resolution would take a lot of CPU time to move such a large section of memory. The new computer has been equipped with both vertical and horizontal smooth scrolling. What this does is allow the video screen to act like a window on top of a larger screen. Thus, we get the effect of moving large amounts of memory without using very much CPU time. It is also important to note that all graphics modes use contiguous memory. This makes address calculations simpler and faster.

The 16-color registers can be set to any of 64 colors. The primary set of colors consists of red, green and blue. Each color has up to three shades. By mixing the color and shades together you produce the effect of shading and contouring of objects. This allows for anti-aliasing (non-stair-step lines), and many other state of the art display techniques. You can set as many of the color registers to the same color as you want. This allows you to hide objects on the screen and have them appear by just changing their palette color. Even more dramatic effects can be produced by changing the palettes continuously, as in producing a flickering fire on the screen.

Another area addressed by the new computer is the interrupt system. Special interrupt control registers have been incorporated to allow the processor to spend far less time in the interrupt service routine. This hardware allows interrupts to be generated by the keyboard, joystick button, serial port, cartridge port, V-blank and a programmable interrupt generator. These interrupts can be vectored to either the IRQ or FIRQ. The programmable timer interrupt has a 12-bit counter and can use either the 15,000 Hz or a 70-ns clock. The programmable interrupt timer can be used to aid the processor in producing sound through the six-bit D/A converter or to provide a clocking system for the "bit-banger" serial port.

Those of you who like good, crisp hardware-generated text are going to love the CoCo 3. As stated earlier, we have 40- and 80-column text with attributes. In addition, there are 32 international characters in the character set. The programmable timer generates the blink rate for the blinking attribute, color registers 0 to 7 produce foreground colors and registers 8 to 15 produce the background colors. Add in the underline and control of border colors and you can produce some pretty attractive screens. However, you will want a CM-8 color monitor. The CM-8 is not another PC-compatible RGBI monitor, but rather an analog Hi-Res RGB monitor.

Each joystick port now has two firebuttons. The resolution of the joystick is still 64 positions internally. However, with the Hi-Res joystick adapter and OS-9 Level II, you can get 640 true analog positions.

With all these features added to this new machine, it still maintains compatibility with its predecessor. The exception is software that uses the VDG/SAM semi-graphics modes or undocumented BASIC ROM calls. Most programs should work if they worked on the Color Computer 1 and 2. Third-party products that follow these rules should work:

1. Use only documented ROM calls
2. Do not write to an address above $FE00
3. Make sure the map is selected for 16K internal and 16K external.

To top off the Color Computer 3, more power has been added to the BASIC ROM in the computer. These range from support of the new graphics o error handling. Figure 1 is a summary of the newly added BASIC commands.

These new features work with the Disk system, giving the user a new Disk Extended BASIC. For compatibility, BASIC still runs at .89 MHz. You will ind the 26 new commands both useful and fun.

OS-9 Level II From Microware Systems

The new OS-9 comes with a windowing system. This system allows you to have a multi-user system at one display and keyboard. Until now the only way you could have more than one program requiring keyboard input and display output was to attach a terminal to the Color Computer. Now, you can tell OS-9 to open another terminal on the *same screen* or a different screen. The windowing system allows for multiple screen and multiple resolutions, and all active at the same time. To my knowledge there is no other system at any price that has this capability. In graphics modes, the system allows the features described in Figure 2.

Figure 2

Select font	You may use different font styles
Point	Plot a point
Line	Draw a line
Circle	Draw a circle
Get block	Copy a block into a system buffer
Put block	Copy a block from system to screen
Fill	Paint the screen
Use logic	And, or, xor, no logic
Use pattern	Apply pattern to command
Ellipse	Draw an ellipse
Arc	Draw an arc
Create a window	
Use overlay window	
Proportional	Proportionally-spaced text
Bold text	
Invert text	
Underline text	
Download font	
Download buffer	
Scale on/off	
Protect on/off	

In graphics, all windows are scaled to 640 by 192. This allows for programs to be written for one size screen without having to worry about what portion of some other screen the application will run on in the future. To change from window to window, the user presses the CLEAR key to move forward to the next window or SHIFT-CLEAR for the previous windows. The window system acts like a super terminal, so you do not use up program memory space for video display.

OS-9 Level II provides many other valuable system functions. Among these is record locking. This allows more than one program to access the same information file at the same time without conflict. Because of the MMU, Level II does not permit memory fragmentation. A full disk driver is included in the system so larger drives can be added in the future.

Developing software under this new system will be a challenge in many ways. First, it is possible to run one OS-9 Level I program under the window system. What this means is that under the Color Computer Level I system, video memory is mapped into the real address space. This Level I video emulation has some additional functionality. Under this system you can have up to two VDG video screens of 6K each or a 16K, 160-by-192 16-color screen, the capability of changing the color palettes and more.

When running any I/O-oriented task, it is the programmer's responsibility to not waste system time or permit his task to endanger I/O.

Here's an example. You have a program that uses the mouse/joystick pointer device on one window and, on another window, you are playing an arcade game. You switch from a friendly user shell on Window 1 to the arcade game on Window 2. You start moving the joystick around to shoot down the flying saucers. Well, by moving the joystick to shoot at the saucer you pull down the disk utility menu back on our friendly menu. If a programmer is not careful, conceivably, when you push the button to fire at the saucer, the button could be misread by the menu which thinks you have selected to format the disk drive. You finish the game, go to the menu and, because the program did not play by the rules, you have lost all the programs and data on the disk. But take heart; OS-9 provides the information so this need not ever happen.

There are some things that both users and programmers should be aware of. First, if you have more than one task running that does disk file I/O, and one of the programs tells you to swap disks in the disk drive, be careful. By swapping the disk, you may deprive the other program of its data. Here again, the programmer should have taken precautions against this by using good error trapping.

With some good forethought by the companies that produce and sell software, the Color Computer 3 could be a new industry standard.

This new machine will challenge the programming community with new possibilities. It will spark our collective imaginations into producing software unlike any other. It will open new doors, cross new boundaries and set Color Computer owners apart from the crowd. Those who intend to write software for Tandy must use OS-9, but they will find that OS-9 will make their lives a lot simpler.

This new software will allow the Color Computer 3 to grow and mature with new, exciting concepts of what can be done on a home computer. Both Radio Shack and the third-party world can produce new, innovative software, and expand our concepts of how we interact with and use a computer.

Howard Medical Computers

We have Rainbowfest prices year 'round!

SMITH CORONA

Smith Corona offers the latest and best in typewriter technology including a built-in 50,000 word dictionary and spelling checker that beeps as a spelling error is made, a full line lift off correction feature!

($7 shipping) **$286**

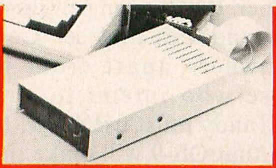
Special interface plug unit transforms the Smith Corona typewriter into a wordprocessing printer for your color computer. Includes both serial and parallel output.

$96

DISK CONTROLLER NEW FROM J&M

The DC-4 is a stripped down version of the very popular DC-2 and includes all the same features such as memory minder automatic format recognition, gold circuits, metal box, and software selectable tract seek rate except for ROM switch and parallel port.

($2 shipping) **$65**



TEAC DISK 55B DRIVE

The Teac 55B fits into the spare slots in the Radio Shack 501 Disk Drive. This bare drive features 40 Track, double sided 360K potential and a six millisecond track seek rate.

($2 shipping) **$132**

The **DD-2** combines the Teac 55B with our ½ height horizontal case and heavy duty power supply.

($2 shipping) **$188**

GUARANTEE

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back, (less shipping).

RS DOS ROM CHIP

ROM chip fits inside disk controller. 24 pin fits both J&M and RS controller Release 1.1.

Reg. $40 ($2 shipping) **$20** each

BOTEK

Serial to parallel converter converts the CoCo 4 pin serial output to run a parallel printer like Star or Epson. Includes all cables. Add $10 for modem attachment.

($2 shipping) **$68.45**

WORD PACK RS

This ROM pack is the hardware answer for an 80 column display. It includes a built-in video controller to drive a monochrome monitor like our 123A. To get started, you need OS-9 2.0, a Y-cable or multipack interface drive 0, and a monochrome monitor.

($2 shipping) **$89**

New basic driver runs word pack without need for an OS-9.

$10

MONITORS

ZENITH 123A 12"

This 12" green screen high resolution monitor offers 80 column capability, Zenith quality and a 30 day warranty valid at any of Zenith's 1200 locations.

Retail $149
Our price **$67.50** **REPACK** ($7 shipping)

122A Zenith 12" Amber Screen offers the same 640 dots × 200 dots resolution at 15MHz as the 123A and a 90 day warranty valid at our 1200 locations.

($7 shipping) **$88**

Closeout Specials — only 14 in stock. We have a limited number of lesser known color monitors that have been discontinued but are brand new in their original boxes.

139 ($14 shipping)

141 Roland 13" Color Monitor with speaker, 270 dots × 200 dots resolution, 4 MHz band width.

$217 ($14 shipping)

131 Zenith 13" Color Monitor has medium resolution with speaker and RGB jack.

($14 shipping) **$168**

All monitors require an amplifier circuit to drive the monitor and are mounted inside the color computer. They attach with spring connectors, with two wires extending out of the computer, one for audio and one for video.

VA-1 for monochrome monitors *only*, fits all color computers

($2 shpg) **$24.45**

VC-4 for monochrome or color, fits all color computers

($2 shpg) **$39.45**

Howard Medical Computers 1690 N. Elston Chicago, IL 6062

ORDERS
(800) 443-1444

INQUIRIES AND ORDER STATUS
(312) 278-1440

Showroom Hours:
8:00 – 4:00 Mon. – Fri.
10:00 – 3:00 Sat.

WE ACCEPT: VISA • MASTERCARD • AMERICAN EXPRESS
C.O.D. OR CHECKS • SCHOOL P.O.'S

The Biggest
The Best
The Indispensable

ORDER RAINBOW ON DISK NOW AND SAVE!

As a special introductory offer, you can subscribe to **RAINBOW ON DISK** before January 1, 1987, for only $90 — **$9 off** the regular subscription price. *Don't miss out — order today!*

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE

It's called the *premier Color Computer magazine* for good reason. **THE RAINBOW** is the biggest, best, brightest and most comprehensive publication a happy CoCo ever had! Is there any wonder we get letters daily praising **THE RAINBOW**, the magazine one reader calls "A Pot Of Gold" for his Color Computer.

THE RAINBOW features more programs, more information and more in-depth treatment of the Tandy Color Computer than any other source.

A monthly issue contains more than 200 pages and up to two dozen programs, 14 regular columns and as many as 20 product reviews. And advertisements: **THE RAINBOW** is known as *the* medium for advertisers — which means every month it has a wealth of information unavailable anywhere else about new products! Hundreds of programs are advertised in its pages each month.

But what makes **THE RAINBOW** is its people. Nationally known people like Bill Barden, who has written 27 books on computer topics and writes for us each month. Or, Fred Scerbo, who writes special programs at the request of readers. Experts like Dick White and Joseph Kolar, two of the most knowledgeable writers on BASIC. Communicators like Marty Goodman and Cray Augsburg, who stay abreast of telecommunications advances. Or, Dan Downard, **RAINBOW** technical editor, who answers our readers' toughest questions. Educators like Dr. Michael Plog and Steve Blyn, who show how CoCo can be used at home or school. Advanced programmers like Dale Puckett, who guide you through the sophisticated OS-9 operating system. Electronics experts like Tony DiStefano, who explain the "insides" of the CoCo. These people, and many others, visit you monthly through columns available only in **THE RAINBOW**.

Every single issue of **THE RAINBOW** covers the wide spectrum of interests in the Tandy Color Computer — from beginners' tutorials and arcade games to telecommunications and business and finance programs. Helpful utilities and do-it-yourself hardware projects make it easy and fun to expand your CoCo's capabilities. And, monthly reviews by independent reader reviewers take the guesswork out of buying new software and hardware products.

Join the tens of thousands who have found **THE RAINBOW** to be an absolute necessity for their CoCo. With all this going for it, is it surprising that more than 90 percent of **THE RAINBOW** subscribers renew their subscriptions?

We're willing to bet that, a year from now, you'll be doing the same. For more information call (502) 228-4492. **For *credit card orders only*, you may call (800) 847-0309.**

Give Your Fingers A Break!

	RAINBOW ON TAPE	RAINBOW ON DISK
Full Year (12 Issues)	*$80**	*$90* (regularly $99)*
Single Issue	*$10***	*$12***

YES! Sign me up: ☐ *NEW* ☐ *RENEW (attach label)*
☐ *RAINBOW ON TAPE* ☐ *RAINBOW ON DISK*
☐ *A Full Year* ☐ *Single Issue (specify month & year)* ______
Name ______
Address ______
City ______ *State* ______ *ZIP* ______
☐ Payment Enclosed (payment must accompany order)
Charge: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ______
Signature ______ Card Expiration Date ______

For credit card orders, you may want to phone in your subscription; our *orders only* number is (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries, please call (502) 228-4492.

*Subscriptions to **RAINBOW ON TAPE** are $80 a year in the United States, $90 U.S. funds in Canada and $105 U.S. funds in all other countries. Special introductory subscriptions through January 1, 1987, to **RAINBOW ON DISK** are $90 (regularly $99) a year in the United States, $100 (regularly $115) U.S. funds in Canada, and $115 (regularly $130) U.S. funds in all other countries.
Individual issues of **RAINBOW ON TAPE are $10 in the United States, $12 U.S. funds in Canada and all other countries. Individual issues of **RAINBOW ON DISK** are $12 in the United States, $14 U.S. funds in Canada and $16 U.S. funds in all other countries.
Kentucky residents add 5% sales tax. **In order to hold down non-editorial costs, we do not bill.**
RAINBOW ON TAPE and **RAINBOW ON DISK** are not stand-alone products; you will still need the magazine for loading and operating instructions and the necessary documentation. **THE RAINBOW** magazine is a separate purchase.

Get Your Very Own Pot O' Gold!

Here's your chance to have a Pot O' Gold full of programs, articles and information about CoCo every month of the year! A subscription to **THE RAINBOW** is only $31* and you won't miss a single chock-full issue.

As the premier magazine for the Tandy Color Computer, **THE RAINBOW** has more of everything — and greater variety, too. Do yourself and your CoCo a favor and subscribe to **THE RAINBOW** today!

We accept VISA, MasterCard and American Express, Non-U.S. rates higher. **U.S. currency *only*, please.**

YES! Sign me up for a year (12 issues) of **THE RAINBOW.**
☐ *NEW* ☐ *RENEW (attach label)*
Name ______
Address ______
City ______ *State* ______ *ZIP* ______
☐ Payment Enclosed (payment must accompany order)
Charge: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ______
Signature ______ Card Expiration Date ______

For credit card orders, you may want to phone in your subscription; our *orders only* number is (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries, please call (502) 228-4492.

*Subscriptions to **THE RAINBOW** are $31 a year in the United States. Canadian rate is U.S. $38. Surface rate elsewhere is U.S. $68. Air mail U.S. $103. All subscriptions begin with the current issue. Please allow 6 to 8 weeks for first copy. Kentucky residents add 5% sales tax.**In order to hold down non-editorial costs, we do not bill.**

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1 PROSPECT, KY

POSTAGE WILL BE PAID BY ADDRESSEE

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1 PROSPECT, KY

POSTAGE WILL BE PAID BY ADDRESSEE

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

Two great ways to bring the Rainbow into your life . . .

Just for your COLOR COMPUTER 1, 2 and 3
September 1986
Canada $4.95 U.S. $3.95
The RAINBOW
THE COLOR COMPUT
Y MAGAZINE
New Color Computer 3
CoCo Better Again!
Our Ann
RAINBOW
on tape
NOVEMBER 1986

Rainbow on Tape & Rainbow On Disk!

For more than four years now, tens of thousands of **RAINBOW** readers have enjoyed the luxury of **RAINBOW ON TAPE**. Each month our tape service subscribers receive all the great programs from the pages of **THE RAINBOW** (those over 20 lines long), without the trouble of having to type them in.

Now, in addition to **RAINBOW ON TAPE**, there is **RAINBOW ON DISK** — another great way to bring **THE RAINBOW** into your life.

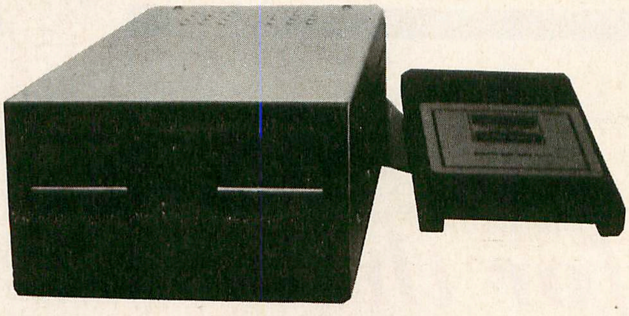
Each month, all you do is pop the tape into your cassette player or the disk into your drive. No more lost weekends typing, typing, typing. As soon as you read an article about a program in **THE RAINBOW**, it's ready to load and run. No work. No wait.

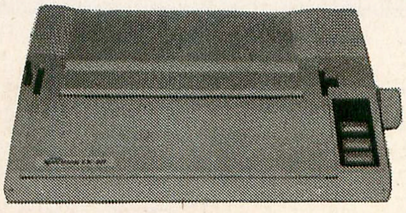
Yes, you could type the programs in yourself, as many people do. But all of them? Every month? There simply isn't enough time.

Just think how your software library will grow. With your first year's subscription, you'll get almost 250 new programs: games, utilities, business programs, home applications — the full spectrum of **THE RAINBOW**'s offerings without the specter of keying in page after page of listings and then debugging. And, with **RAINBOW ON DISK**, you'll also get all the OS-9 programs.

RAINBOW ON TAPE and **RAINBOW ON DISK** — as we've said before, they're the "meat" of **THE RAINBOW** at a price that's "small potatoes." And now you even have a choice about how it should be served up to you.

To get your first heaping helping, just fill out and return the attached reply card. No postage necessary.





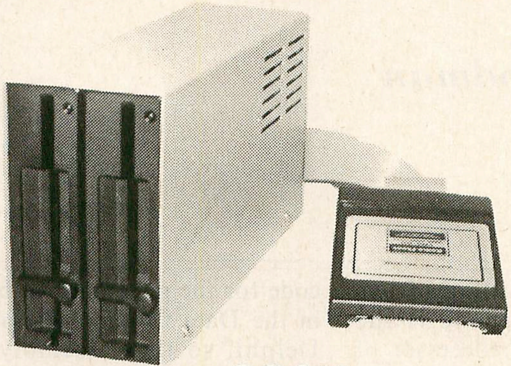
EPSON® LX-80 PRINTER 239^{95}

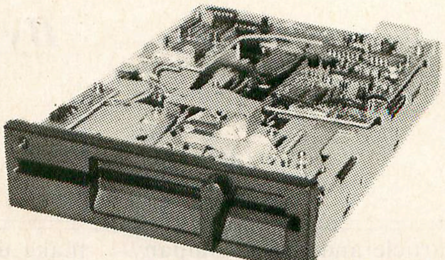
The logical choice for your CoCo! 80 column, 100 CPS in draft mode, 16 CPS in near letter quality mode, 1K Buffer, compatible with CoCo max. 1 year warranty* LX-80 Tractor Feed 27.95. Serial to parallel converter starting at only 49.95.

*We are authorized Epson® Sales and Service

Drive 0 and 1 269^{95}

One double sided drive with doubler board and new RS controller so you can have the equivalent of 2 drives in one. You can even backup from 0 to 1. Works with all CoCo's. Compatible w/RS DOS. No special operating system needed.



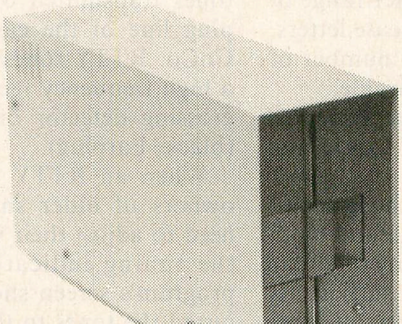


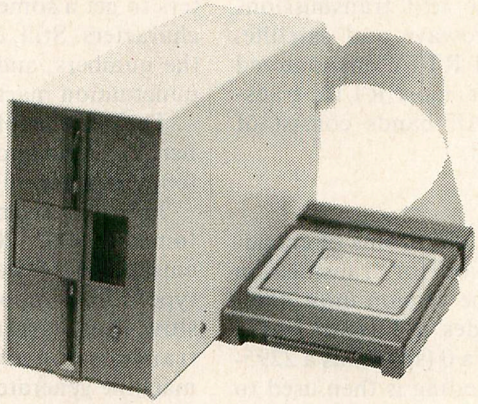
2 Drives 299^{95}

Both our drive 0 and 1 in one case, with cable and R.S. controller. The best just got better!

Drive 1 Upgrade 119^{95}

Add a second 1/2 height drive to your Radio Shack® Thin Line Disk Drive. Comes with 3 minute installation instructions, screwdriver required. Please specify either catalog #26-3129 or 26-3131 when ordering.





Drive 1 125^{95}

Your Choice
Silver or White

199^{95} Drive 0

SUPER DRIVE SALE

Special prices on new first quality disk drives. They even have GOLD connectors on the back...Some other places charge 229.00 for dr. 1 and 299.00 for dr. 0, not us! Drive 1 is I, Second Color Computer drive, or external mod III, IV. Drive 1 just plugs into the extra connector on your Drive 0 cable. Both drives are compatible with any version of the Color Computer and all versions of drives. Drive 0 is your first Color Computer drive and comes complete with cable, manual, and R.S. controller. Bare full hgt SSDD drive only 79.95.

THE COMPUTER CENTER
901-761-4565, 5512 Poplar, Memphis, TN 38119

Add $4.90 for shipping and handling—Visa, MC & money orders accepted, No CODs
Allow an additional 3 weeks for personal checks—Drive faceplates may vary slightly
Prices subject to change without notice. Radio Shack is a registered trademark of Tandy Corporation
Prices subject to change without notice.

16K
ECB

RTTY for the Color Computer

By Marty Goodman

This article and the accompanying program provide a simple, practical means of using the Radio Shack Color Computer to send and receive RTTY information. Nonlicensed radio enthusiasts may find the article and the program of some interest, although most of the commercial international radio text transmissions are sent via microwave and satellite. Indeed, outside of RTTY encountered on the Ham bands, most RTTY transmissions in the HF bands consist of encrypted material.

What Is RTTY?

RTTY is a very old means of encoding text information for transmission over the radio. The version most commonly used encodes a 1 (mark) as a 2125-Hz tone and a 0 (space) as a 2295-Hz tone. This encoding is then used to make up characters consisting of five bits each. This five-bit code is the Baudot code, an early predecessor of the present-day, seven-bit ASCII code. Five bits allow for coding only 32 different characters, but one of those codes is a shift character, which can be used in conjunction with other characters to get a somewhat greater range of characters. Still, only uppercase letters, the numbers, and a limited number of punctuation marks are allowable.

The version of RTTY implemented here can send and receive at 45.45 Baud (60 words per minute).

This may seem slow to those accustomed to 300, 1200 or 2400 Baud modems, but it is faster than many folks can type. More important, it is sufficiently slow that it results in more reliable transmission over radio than even machine generated and received Morse code. Thus, while the RTTY protocol is quite old and slow, and while this program is a fairly limited implementation of it, it still has real practical value to radio amateurs.

Program Characteristics

The program to be presented is a simple one. Many desirable features, such as backspace in the transmit buffer, saves to disk, and transmitting of a previously prepared text file, have not be implemented. Macro 80C Source code for the program will be available in the Data Communications area on Delphi, so that assembly language programmers may enhance it as they please. The program supports only the slowest Baud rate for RTTY transmission. However, this program allows you to type at the keyboard and have RTTY tones transmitted out the gray (Aux) plug line of the cassette port on the CoCo. RTTY tones are received from a high frequency receiver into the zero crossing detector of the cassette port (black, Earplug).

When an RTTY signal is received, owners of older shortwave receivers need to adjust their variable BFO until the tuning indicator on the RTTY program's screen shows they have adjusted the tones to the right frequency. Reception in such cases is greatly enhanced if a narrow band audio pass filter is used to filter the output of your HF receiver. Such a pass filter should be constructed to pass very narrow bands centered on the two tone frequencies, 2125 and 2295 Hz. Some HF receivers come with a built-in RTTY filter centered on 2200 Hz. If such a feature is available, it should be used. Owners of newer digital receiver equipment will not have a variable BFO, but may be able to get by using an IF shift control that is often provided, combined with a 200-Hz IF filter if that is available.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Hardware Setup

The output of your receiver is fed into the cassette input of the CoCo. As noted, a narrow pass audio filter greatly improves performance. If your audio output is more than a volt peak to peak, you might want to use dual diodes (as illustrated in the *WEFAX* interface in the February 1985 RAINBOW) as a voltage limiter. Your transmitter's microphone input is fed from the CoCo cassette output port. You may need to use a 100K ohm resistor in series with this signal, and/or a 1K to 10K ohm resistor in parallel with it, in order to match the impedance and amplitude of the CoCo cassette output to your transmitter's microphone input. The cassette motor relay jack is used to key your transmitter. This is all exactly as was the case with the *WEFAX* program and *Graphicom SSTV*.

Using the Program

Type in (or obtain via RAINBOW ON TAPE, or download from the Delphi RAINBOW ON TAPE database topic area) the program *RTTY.BAS* that follows. Now run the program. This program pokes its data into memory, and creates the machine language program *RTTY.BIN*. It then allows you to save that program. Now load the *RTTY.BIN* program, and type EXEC.

The screen clears. You see the tuning meter in the left part of the first line on the screen. There is a black cursor at the left side of this tuning meter. When receiving RTTY signals, adjust your receiver so that the black cursor is flipping back and forth between both sides of the tuning meter area, thereby centering the output frequency of your receiver to around 2200 Hz. Three lines up from the bottom of the screen you see the bright yellow receive cursor. This cursor moves as text is received. You will be able to see up to thirteen, 32-column lines of received text on the screen before it scrolls off the top of the screen. The second to last line of the screen shows the transmit cursor in dark red (black if you are using a monochrome monitor on your CoCo). You have two lines of screen in which to see what you have typed. RTTY is used in simplex, and the two parties talking must take turns.

RTTY.BIN for the CoCo starts up in receive mode. Pressing the CLEAR key toggles it from receive mode to transmit mode and back again. While you are in receive mode, you can still type on the keyboard, and what you type will be saved in a buffer, to be transmitted when you switch over to transmit mode. The BREAK key clears out any material in the transmit buffer that has not yet been sent.

RTTY.BIN recognizes, in addition to the 26 capital letters of the alphabet and the 10 numerical digits 1 through 0, the following punctuation marks: carriage return-line feed pair, space and ! " # $ & ' ( ) - ; : , . / ?

The program also supports a BEL character, which is received as an up-arrow character to the screen, and transmitted by pressing the up-arrow key. There is no provision for a backspace under Baudot code.

Notes on the Program

Like the *SSTV* routines in *Graphicom*, and the *WEFAX* program, *RTTY.BIN* depends on the use of tightly coded timing loops for its ability to send and receive signals essentially without external hardware. Such code has to be carefully written so all

★★★★★★ SELECTED SOFTWARE ★★★★★★

SOLDERLESS UPGRADE KITS
With easy-to-follow instructions
64K FOR E BOARD $39.95
64K FOR F BOARD $29.95
64K FOR COCO2* (ALL MODELS) $29.95
EXTENDED BASIC CHIP $34.95
*All Korean models require one solder joint
Please specify model # with order

NOTE: All ICs used in our kits are first quality 150 NS prime chips and carry one full year warranty.

COCO MAX tape only $64.95
COCO MAX II disk only $74.95
Y-BRANCHING CABLE $27.95
DS-69A DIGISECTOR & C-SEE III SOFTWARE $149.95
HJL-57 KEYBOARD $69.95
THE INTRONICS EPROM Programmer
Program Up to 64K x 8 Eprom $139.95
DATARASE (Eprom Eraser) $39.95
2764 HIGH SPEED COMPATIBLE $5.95
27128 HIGH SPEED COMPATIBLE $7.95
ROM PACK P.C. BOARD with case for 27xx $9.95
TEAC 55B or Fujitsu M2551A
DS/DD ½ Height Drive $109.95
2 DRIVE with Case and Power Supply $269.00
JFD-CP Disk Controller with JDOS 1.2 . . . . . . $129.00

10 DS/DD DISKETTE w/sleeve & label $9.95
Diskette Carousel $24.95
300 Baud Modem Direct Connect* $49.95
*With Autoterm on tape (Disk add $5.00) $64.95
1200 Baud Modem Auto Answer/Dial** $119.95
**With Autoterm on tape (Disk add $5.00) $149.95
Modem Cable $12.95
VIDEO PLUS IIC $34.95
VIDEO PLUS IIU $34.95
REAL TALKER I
With 3 talking games $49.95
REAL TALKER II
With 3 talking games $54.95
NUMBER JACK THE HJL Numeric Key Pad $79.95

WIZARD'S CASTLE
64K Graphic Adventure
By Spectral Associates
Disk only $19.95

TeleWriter 64
Telepatch II
$74.95 (Disk Version)

Top 5 Spectral Associates
games in one package:
Galagon, Lancer, Cubix,
Froggie & Lunar Rover Patrol
for only $34.95 tape or disk

BASIC ROMs DISASSEMBLY
COLOR BASIC UNRAVELLED $17.95
EXTENDED BASIC UNRAVELLED $17.95
DISK BASIC UNRAVELLED $17.95
ALL 3 BOOKS ONLY $39.95
ULTRA 80C DISK EDITOR ASSEMBLER $29.95
BUG OUT & THE ORACLE (M.L. Monitor) $14.95
ALL 5 ITEMS ONLY $59.95
500 POKES, PEEKS, 'N EXECS $16.95
UTILITY ROUTINE (VOLUME 1) $19.95
WITH ROUTINES ON TAPE OR DISK $36.95
ASSEMBLY LANGUAGE PROGRAMMING (TEPCO) $16.95
ALL 9 ITEMS ONLY $119.95

★ LOW PRICES ★ FAST SERVICE ★ FREE SHIPPING ★

	TAPE	DISK		TAPE	DISK
DYNACALC		$69.95	P51 MUSTANG	$26.95	$29.95
PROCOLOR FILE 2.1		$49.95	SAILOR MAN (64K)	$26.95	$29.95
MASTER DESIGN		$24.95	WORLDS OF FLIGHT	$26.95	$29.35
TELEWRITER 64	$39.95	$49.95	DRAGON SLAYER		$23.95
SUPER SCREEN MACHINE	$35.95	$38.95	SR-71	$26.15	$29.75
RAINBOW SCREEN MACHINE	$23.95	$26.95	BUZZARD BAIT	$19.95	$22.95
PEN PAL 2.1		$84.95	GALAGON	$19.95	$21.95
AUTOTERM	$31.95	$39.95	LUNAR ROVER PATROL	$19.95	$21.95
ADOS		$27.95	MS GOBBLER	$19.95	$21.95
SUPER BACKUP UTILITY		$44.95	LANCER	$19.95	$21.95
THE PEEPER WITH SOURCE	$24.95	$26.95	CUBIX	$19.95	$21.95
GRAPHICOM		$19.95	FROGGIE	$19.95	$21.95
BEST OF COCO TIME 85	$26.95	$26.95	SPACE PAC (10 M.L. GAMES)	$21.95	$21.95
UTILITIES BONANZA I		$29.95	EDUCATIONAL PAC (6 PROGRAMS)	$19.95	$19.95
DISK UTILITIES 2.1A		$24.95	ADVENTURE PAC (5 GAMES)	$19.95	$19.95
TELEPATCH II		$29.95	TREASURY PAC (30 GAMES)	$29.95	$29.95

WE PAY SHIPPING in the United States, Canada & Mexico. Overseas please add 10%. (MN Residents add 6% sales tax.) We accept Visa, Mastercard, check or money order. U.S. funds only for foreign orders. C.O.D. please add $2.00. (USA only).

Send to: **SELECTED SOFTWARE**
P.O. Box 32228, Fridley, MN 55432
24 HOUR ORDER LINE 612-757-2439
INFORMATION 612-757-1026 (11 A.M. - 5 P.M. C.S.T.)
24 HOUR SHIPPING

branches in the receive or transmit portions take exactly the same, and exactly the right number, of machine cycles. The signal is received and processed by looking for zero crossings and precisely timing the period of each audio cycle received. Neither interrupts nor timers are used. Even CoCo 3 programmers are now discovering that this technique of tight machine loops for timing can actually work better than using interrupts and timers, for less machine time is wasted stacking stuff and returning from unneeded interrupts.

This sort of code cannot be written under OS-9 or any other interrupt-using, multi-user or multi-tasking system. It is strictly for use in dedicated applications, where the entire machine's resources are servicing only one task. This approach to coding cannot be used on the IBM PC XT or AT (8088/8086-type machines) nor on the Atari 520 ST or 1040 ST. On the Atari 68000 ST systems, machine cycles are stolen unpredictably from the processor in order to service the video (contention type DMA for video) instead of the regularly interleaved video DMA used on the CoCo 1, 2 and 3. On the 8088/8086 processors, there is internal buffering of instructions that makes cycle execution times a nightmare to calculate. On the CoCo, cycles are share regularly (every other cycle) betwee the video and the 6809. Therefor machine language loops can be constructed to take up a precise amount o time. The Color Computer is an idea machine for this sort of application considering its great power, its built-i zero crossing detector, and its moderat cost.

Anyone attempting to modify thi program should be careful. If you d not take great pains to keep all th execution times on the loops of cod exact, modified versions will either no work at all or their performance will b degraded. ☐

210	222
904	74
914	83
922	206
931	12
END	112

The listing: RTTY

```
10 REM THIS PROGRAM IS PUBLIC DO
MAIN, BY N6LQV
20 PCLEAR4
30 CLS
40 PRINT"   RADIO TELETYPE TRANS
CEIVER"
50 PRINTSTRING$(32,"-");
60 PRINT
70 PRINT"NOW GENERATING MACHINE
LANGUAGE"
80 PRINT
90 PRINT"PLEASE WAIT..."
100 ST=&HE00:AD=ST:LI=900
110 READA$,CS
120 IF A$="X" THEN 200
130 FOR I=1 TO 64 STEP 2
140 A=VAL("&H"+MID$(A$,I,2))
150 POKE AD,A:CS=CS-A:AD=AD+1
160 NEXT
170 IF CS THEN PRINT"DATA ERROR
IN LINE";LI:END
180 PRINT@174,938-LI
190 LI=LI+1:GOTO 110
200 IF PEEK(&HC000)=68 AND PEEK(
&HC001)=75 THEN B$="DISK" ELSE B
$="TAPE"
210 PRINT@96,"PROGRAM IS NOW IN
MEMORY AND"
220 PRINT"READY TO BE SAVED. INS
ERT ";B$
230 LINEINPUT"AND PRESS ENTER ";
A$
240 IF B$="DISK" THEN 280
250 CSAVEM"RTTY",ST,AD-1,CS
260 LINEINPUT"PRESS ENTER TO SAV
E AGAIN ";A$
270 GOTO 250
280 SAVEM"RTTY/BIN",ST,AD-1,CS
290 END
900 DATACC343CF7FF01B7FF03B7FF21
F7FF231A500F42CCFEF8DD408E12DADD
44DD46DD,4625
```

About Your Subscription

Your copy of THE RAINBOW is sent second class mail. If you do not receive your copy by the 5th of the month of the publication date, send us a card and we will mail another. Canadian subscribers and foreign airmail allow two additional weeks.

You must notify us of a new address when you move. Notification should reach us no later than the 15th of the month prior to the month in which you change your address. Sorry, we cannot be responsible for sending another copy when you fail to notify us.

Your mailing label also shows an "account number" and the subscription expiration date. Please indicate this account number when renewing or corresponding with us. It will help us help you better and faster.

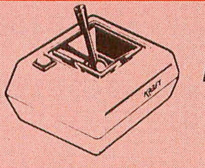
For Canadian and other non-U.S. subscribers, there may be a mailing address shown that is different from our editorial office address. Do not send any correspondence to that mailing address. Send it to our editorial offices at Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059. This applies to everyone *except* those whose subscriptions are through our distributor in Australia.

Quality Hardware & Accessories from COMPUTERWARE®

NEW! Printer Stand

Adjusts to any printer size. A contemporary design, with paper holder included. Ivory color. A welcome addition to any work space.

$24.95



KRAFT

JOYSTICK

$19.95

SALE! Mitsuba 1200 Modem

A perfect clone of the popular (and expensive) Hayes modem. The features include 1200 baud or 300 baud operation, direct connect, touch tone or pulse dialing, full or half duplex, speaker alert to busy signal, and complete compatibility with the Hayes Smartmodem 1200.

CoCo cable $25.00 Modem $169.00

Universal Video Plus
Composite video interface for all Color Computers

Compare our Universal Video Plus to any other interface, and we are confident that you will find ours to be a superior product.

- The Universal Video Plus works with every CoCo. Easy-to-follow, clear instructions are included.
- All cables (audio and video) are included. No need to buy extenders or extra cables as required by other drivers.
- Heavy duty construction, evidenced by sturdy leads and connectors.
- Shielded audio and video cables insure that no extra RF interference is introduced from the Universal Video Plus.
- The adjustment pot on the Universal Video Plus makes it easy to optimize the video signal for each computer. You don't have to modify your computer to get a good display.
- Our advanced design gives the highest quality display.
- Installation is easy. There is no soldering and no dismantling of the RF shield.

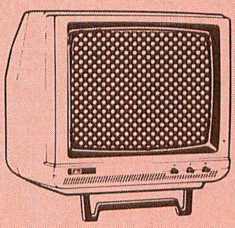
$34.95

Call or write for our NEW fall/winter catalog

Monochrome Monitor

The 20 mhz band width, 800 line resolution, and 80 x 25 display insure a crisp picture. The non-glare screen and streamlined style is also attractive. It also has audio!

Green 12" Amber 12" **$114.95**
plus $5.00 shipping

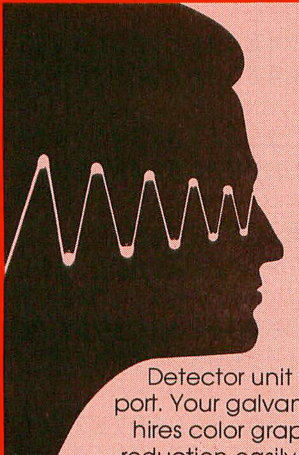


SAKATA Color Monitor

WHILE SUPPLIES LAST

Beautiful 13" color display with 280 x 300 line resolution. Includes composite video color and audio.

$175.00
plus $15.00 shipping



Bio Detector

Biofeedback & Lie Detector Game

Learn the art of relaxation through biofeedback — or use the same device for party fun as a lie detector game. Software for both is included. The Bio Detector works through silver finger sensors attached to the Bio Detector unit which plugs into the joystick port. Your galvanic skin response is plotted in hires color graphics and sound. Learn stress reduction easily by watching your responses on the screen. The Anxiety Attack Game will provide hours of embarrassing and truthful fun as well. All hardware, software, and instructions are included.

Requires 16K $24.95

Call or Write to:

COMPUTERWARE® **(619) 436-3512**
Box 668 • Encinitas, CA • 92024

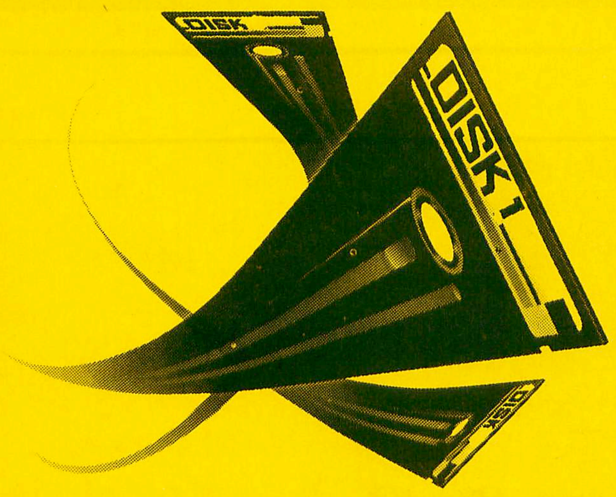
Name ______
Address ______
City ______ State ______ Zip ______
Yes! Send me your FREE catalog! CoCo ☐
VISA MasterCard
Card # ______ Exp. ______
Signature ______

Item	Format	Price

Shipping
Surface — $2 minimum.
2% for orders over $100
Air or Canada — $5 minimum.
5% for orders over $100
Checks are delayed for bank clearance

6% Calif. Sales Tax ______
COD Add $5 ______
Shipping* ______
TOTAL ______

```
901 DATA480F4A0F4B8E12029F4E9F5F
0F530F588E0400CE12B2A6C0A7808C04
2025F7CC,2970
902 DATA6060ED818C060025F98E05E0
9F4C86BFA7848E05A09F5D869FA7848D
568D0220,3773
903 DATAFA9E5FA6862B3081602602 8D
409E5DA7808C05C0251A8E0420EC8820
ED818C05,3403
904 DATAA025F6CC6060ED818C05C025
F98E05A09F5D869FA784394C26088660
A79F005D,3807
905 DATA20D44C26058E12222 0064C26
058E12029F5F3996532703170 0EF0F59
0F5A0F56,2034
906 DATAC6138D78DC5581522 50721FE
5A2A0A20E25C2B022003CC007FD7564F
D655D359,3207
907 DATADD5983052024 06AC01AC0120
D3DD598605975BCC0013975697578D40
4FD655D3,3292
908 DATA59DD5983052024 0FDC558152
C900D7560C5712C6122 0E3DD59D65658
D157065C,3320
909 DATA0A5B26CFAC94C6088D124FD6
55D359DD5983029025EE965C44444439
8D4C4FD3,3581
910 DATA59DD59CC00028D42CB028D3A
CB028D36D755C05950 2B022003CC0000
C10F2202,2805
911 DATA2003CC000FD1582606 3D3DAC
8B20138E0410A68584BFA7859658D758
E686CA40,3334
912 DATAE78617012639AC01AC018601
5CC1602504A1012005B5FF2027F25CC1
602504A1,2918
913 DATA012005B5FF2026F2398E0405
CE12D2A6C0A7808C040D25F7CC343CF7
FF21B7FF,3811
914 DATA01860 2B7FF200F590F5A9E46
9C442724CC0F61DD5186 05975BE6809F
46D75C5F,3331
915 DATA8D54AC94CC00085A26FD045C
8D480A5B26F2EC9B3DAC8BCC15ACDD51
538D3796,3719
916 DATA5326C7CC343CB7FF21F7FF01
8E0405CE12B7A6C0A7808C040D25F739
B6FF208A,3926
917 DATA02B7FF20862A975039B6FF20
84FDB7FF208627975039 24048DE22004
8DEB2000,3572
918 DATA801D4A26FDB6FF2088FCB7FF
20D6504FD359DD59935124088D0F9650
802320E2,3911
919 DATADD5939AC943DAC013996422 6
7CDC40C037498A0124022003CCFEF8DD
408E0152,3388
920 DATA3AB7FF02B6FF008A801F89E8
84E48421FEA7848607DD429E449C4626
C69C4826,4061
921 DATAC48E12DA9F469F489F443996
42263ADC40C037498A0124022003CCFE
F8DD408E,3579
922 DATA01523AB7FF02B6FF008A801F
89E884E48426BEA78496414C27088B37
974121FE,3738
923 DATA20818607DD4216FF7A4A9742
D641CB08D7410443247586 7FB7FF02B6
FF008440,3607
924 DATA27058E124220058E127A2000
A685E6852B289E44984AD74A84602609
C41FE780,2968
925 DATA3D21FE2012C5402604861B20
04861F2000C41FED81A1019F44399E44
5C260E96,2654
926 DATA4A8440974ACC0004E7803D20
EA5C260BCC0802A780ED81A18B20DC5C
26040353,3177
927 DATA20055C273AA1843DA18B39D6
4B273EC004D74B8E05E03AEC84ED88E0
CC6060ED,3840
928 DATA81EC84ED88E0CC6060ED84D6
4B27043DAC84398E05E09F4C86BFA784
21FE3986,4321
929 DATA60A79F004C9F46CC0020D74B
399E489C442607CC000C5A26FD39A680
9F489E4E,3224
930 DATAA6862B129E4CA7808C060024
139F4C86BFA784AC8B394C260F128660
A79F004C,3097
931 DATA8620974B3D3084394C26098E
12229F4EA1012 00B4C26078E12029F4E
20013D3D,2124
932 DATA1239804 5FF41605349558044
524A4E46434B545A4C57485950514F42
47FE4D58,2865
933 DATA56FD8073FF6D605E78778064
74676C617A68756269726376707179 7F
66FE6E6F,3954
934 DATA7BFD8043594E49414D5A5446
4B4F525C4C5856574A4550475E535D55
51258080,2885
935 DATA80FF363733212A3035272638
2E3E2C233C3DFEFDFC80808080804 3
594E4941,3059
936 DATA4D5A54464B4F525C4C485657
4A4550475E535D5551258080 80FF802D
31342980,2819
937 DATA3A2B2F328080808039FEFD
FC808080805254545960524543 4549
5645606 0,3436
938 DATA60606 04D41524B6D6D7E7C6D
6D53504143455452414E534D49540000
00000000,2263
939 DATAX,3584
```



They're here! All NEW Products for the CoCo 3!

Color Connection IV

by BJ Chambless

New features include 80 columns, higher baud rates, and more! This is the most comprehensive modem package for the CoCo 3. All standard protocols are supported including CompuServe's Protocol B, XMODEM protocol, and XON/XOFF. Full support of the auto answer/auto dial feature for both Hayes compatible and some Radio Shack modems is provided. Single key macros allow easy entry of often-used passwords and ID's with a single key stroke.

Requires 128K, CoCo 3, Disk **$49.95**

Color Scribe II

This great Word Processor can take full advantage of the 80 column display of the CoCo 3. Justification, Headers, Footers, and Pagination make it perfect for letters and documents as well as programming in BASIC, PASCAL, "C", and Assembly Language. (A special option allows you to disengage the formatter, allowing more free memory for program editing.) Over 20 line editing commands include capabilities like character insert and delete, skip over words, breaking a line, and more! A complete, easy-to-understand manual accompanies your disk.

Requires 128K, CoCo 3, Disk **$49.95**

The Magic of Zanth

by Scott Cabit

In the Land of Zanth, magic is commonplace. Dragons, Griffins, Centaurs and Demons abound. You are sent on a quest to discover the source of magic in the land of Zanth. This intriguing adventure features over 2 dozen hi-res 16 color animated graphic screens, 4 voice music and sound effects, and speech (when used with the Tandy SSC pak). The 16 color, 320 x 192 graphics look great on either a composite color monitor, an analog RGB monitor, or a television.

Requires 128K, CoCo 3, Disk, (SSC pak optional) **$34.95**

Return of Junior's Revenge

by BJ Chambless

This is the same Junior you've seen in the Kong arcade series, but with new CoCo 3 graphics. This tireless little monkey must overcome all sorts of obstacles (4 screens worth) to rescue his father, The King, from the mean zookeeper. He will traverse the jungle and swamp, climb vines, avoid chompers and birds, open locks and more before he finally meets with his big daddy. The 16 color, 320 x 192 graphics are superb on either a composite color monitor, an analog RGB monitor, or a television.

Requires 128K, CoCo 3, Disk **$34.95**

Call or write for our NEW fall/winter catalog

It's filled with special prices and coupons for extra savings

By the time you read this ad . . .

. . . even more products will be available for the new CoCo 3.

. . . many OS-9 products will be available to run on OS-9 Level 2.

Order your FREE catalog today!!!

Introductory Special
$3.00 off any order for CoCo 3 Software
offer expires November 30, 1986

Call or Write to:

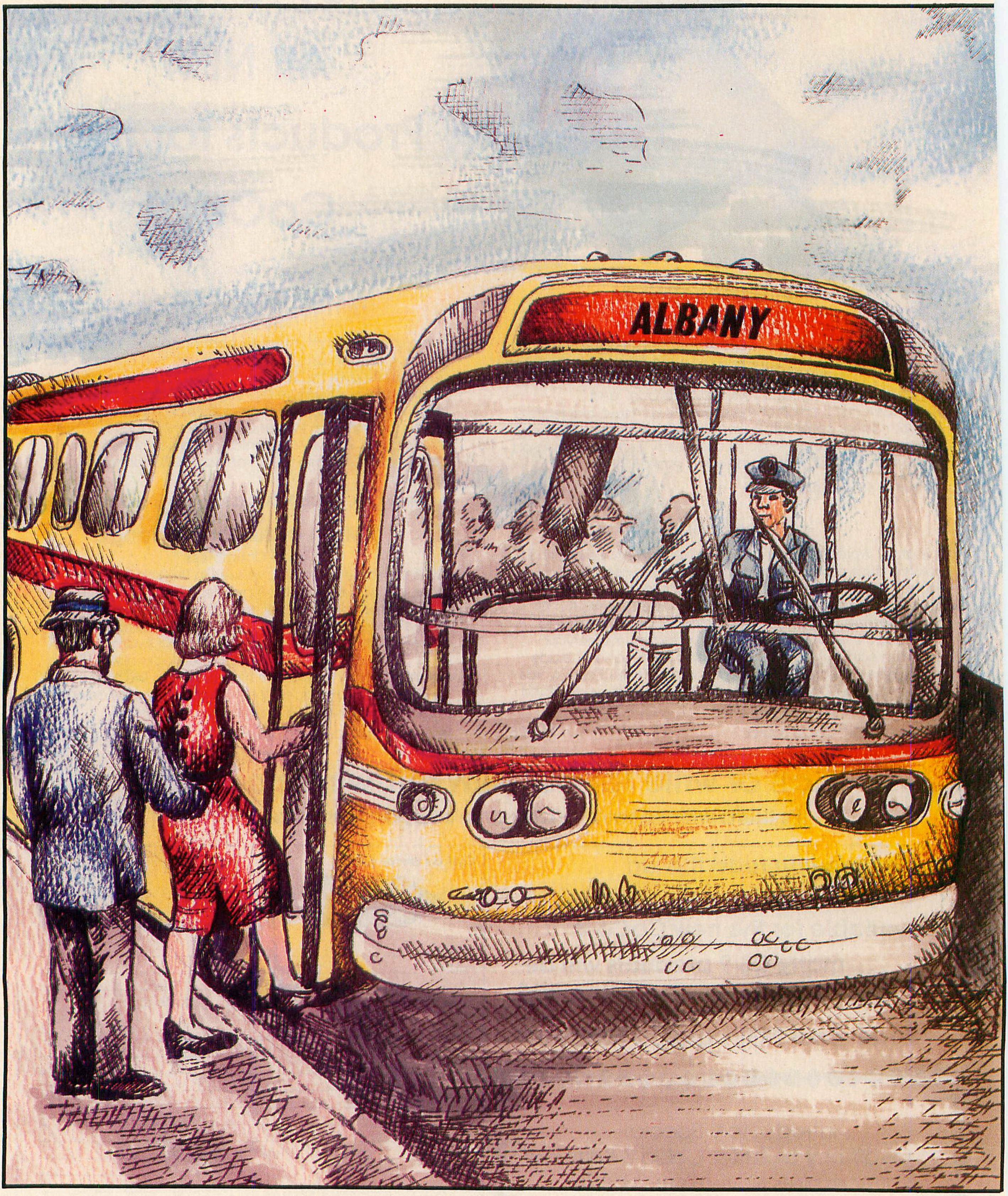
COMPUTERWARE® **(619) 436-3512**
Box 668 • Encinitas, CA • 92024

Name ______
Address ______
City ______ State ______ Zip ______
Yes! Send me your FREE catalog! **CoCo** ☐
VISA MasterCard
Card # ______ Exp. ______
Signature ______

Item	Format	Price

Shipping
Surface — $2 minimum.
2% for orders over $100
Air or Canada — $5 minimum.
5% for orders over $100
Checks are delayed for bank clearance

6% Calif. Sales Tax ______
COD Add $5 ______
Shipping* ______
TOTAL ______


ALBANY

ut worldwide communication right in your "packet"

Hamming It Up

By Len Popyack

When was the last time you lost sleep playing with your CoCo? For me it has happened only twice — once when I bought my computer back in 1981, and again after I bought my Packet Radio interface.

Have you ever thought about being able to call up anyone's computer system anywhere in the world, leave them a message, transfer a program, or simply chat with them — all for free? It is possible to communicate digitally with anyone via conventional toll telephone lines, but you always have to pay for it. It's also possible to communicate with any other licensed amateur radio operator (or his computer) using Packet Radio.

What Is Packet Radio?

Packet Radio is a way in which any Ham (slang for amateur radio operator) with a Terminal Node Controller (TNC) can send digital information to another Ham with a TNC. The data is transmitted at 1200 Baud and can be sent around the country. When the data arrives at its destination it is guaranteed to be error free. What more could one ask for!

Len Popyack holds a bachelor's degree in electrical engineering and works as an engineer for General Electric in Syracuse, New York. Len enjoys developing assembly language programs for the CoCo. He is active in Amateur radio and his call is KA2NYJ.

The device that allows the radio transceiver to be connected to your CoCo is called a Terminal Node Controller. Most TNCs are actually self-contained microcomputers. The TNC allows you to connect to another TNC by commanding your TNC to make the connection, similar to the way you command the telephone company to connect you to another number by dialing the number.

Amateur radio packet communication actually got started in Canada about 1978. The Canadian government issued a special digital communications license, and packets of data were soon heard in Canada.

It wasn't until November of 1981 that the US amateurs got organized to develop a TNC that could be sold at a low cost. The organization formed was the Tucson Amateur Packet Radio Corporation (TAPR). Many dedicated engineers and programmers from around the country worked together in TAPR to design a low-cost TNC.

Other amateur groups, such as the Amateur Radio Research and Development Corporation (AMRAD), Amateur Radio Satellite Corporation (AMSAT) and the American Radio Relay League (ARRL) took part in packet radio's early development.

To get a feel for what packets are and how they are used, imagine a bus loaded with people. On the front of this bus is a sign displaying its destination. This bus is the packet and the people inside are data.

The bus originated at a bus station, say Buffalo, and its destination is Albany (see Figure 1). The bus only has a limited amount of fuel, so it must make stops at Rochester and Utica for

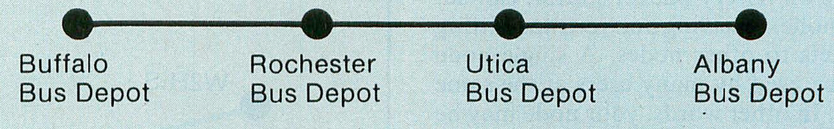


Figure 1: Packets are similar to buses on an interstate highway. In this example, a bus is traveling to Albany from Buffalo.

refueling and to check that all the passengers arrived safely and comfortably.

The front of the bus is the packet header, the road is a communication channel and each bus station is a node (see Figure 2). Each packet originates at a node and may stop at a few nodes for error checking and re-transmission to the next node (similar to refueling the bus). The channel (road) is a radio link. This link connects each node to another. By transmitting packets from node to node, one can transfer data from Buffalo to Albany as easily as transferring data across town by conventional phone modems.

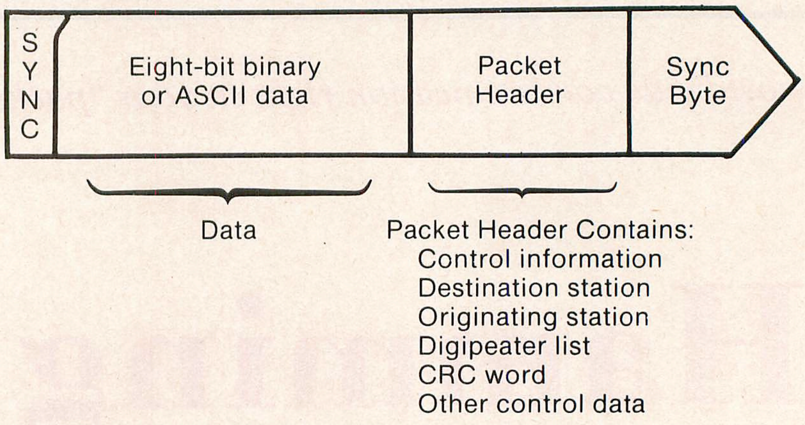


Figure 3: Expanded view of a packet

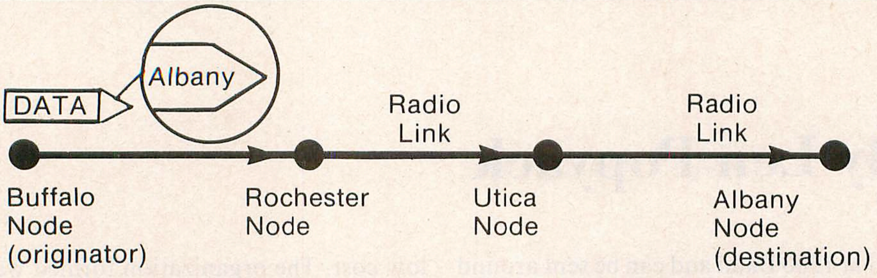


Figure 2: A packet of data is being transmitted from Buffalo to Albany via a node in Rochester and a node in Utica.

During the course of a digital communication, your TNC sends many packets of data along the path, from node to node, until the packets reach the destination. A packet contains the data you type on your CoCo, along with information that each TNC uses to decide where to send your data (see Figure 3). Additional information in each packet is used for error checking and other packet network information.

The nice thing is that your TNC takes care of all the "dirty work." You simply tell it who to establish a connection with and through which nodes.

A node is a TNC and a radio which is left on. Every packet station can act as a node, receiving and re-transmitting packets to other nodes. A single node can be used by many users at the same time. In other words, your node may be part of many different connections (see Figure 4). You may also be using your TNC to talk to another computer while someone uses your TNC as part of his connection path. The TNC takes care of it all. The connection placed through your node remains transparent to you.

Usually, amateurs tend to use a node with a wide coverage (i.e., capable of receiving and transmitting to a large area). These nodes generally consist of an amateur station with a TNC, a radio and sometimes a computer left on. These "super nodes" are referred to as digipeaters.

Because of the frequency of operation where packet communications takes place (145 MHz 2-meter band), the radio signals have a range of about "line of sight." This limitation dictates high-elevation digipeaters (for a greater line of sight). Most digipeaters are located on mountains or where the elevation of the terrain is the highest for a given area (see Figure 5). Digipeaters in my area (New York state) typically have ranges from about 50 to 100 miles.

One nice thing about Packet Radio is you can use up to eight nodes (digipeaters) to establish the communication path you want. These nodes don't have to be digipeaters per se, but may be local nodes.

Now that you know what a digipeater is (actually just another node), I'll throw a new twist into the digital communication network; gateways. A gateway is a means of access to another location other than the conventional node-to-node link. A gateway could be a high-speed link from the eastern U.S. to the west. It could also be a slow-speed link from east to west.

Think of a gateway as a node that looks to you as being in your area, but links you to a similar gateway at a location very far away (see Figure 6). The actual radio link between gateways can be a variety of communication types. The gateway could be a slow-speed (300 Baud), high-frequency link (Figure 7a), a high-speed, land-based

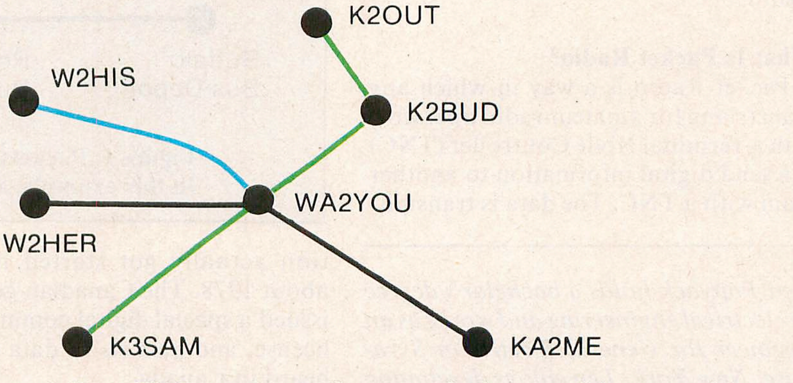


Figure 4: Your TNC may be used as part of other people's connection path. You may also use your TNC to communicate (blue) to another Ham while others use your TNC to rebroadcast their packets.

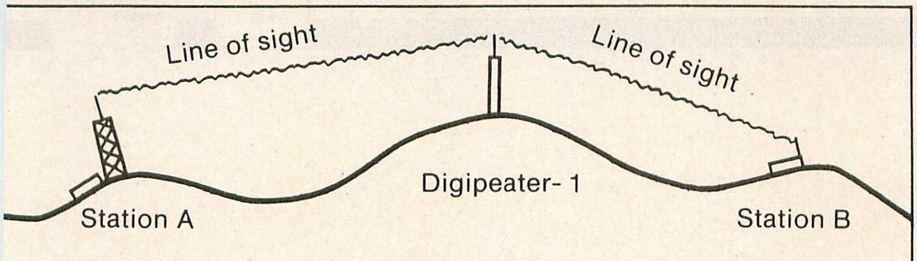


Figure 5: Because of the Earth's curvature, digipeaters are usually located at high locations. Station A can send packets to Station B using Digipeater-1.

communication channel (Figure 7b), or even a satellite link (Figure 7c).

As mentioned before, the Terminal Node Controller which you connect your CoCo to (via an RS-232 cable) is actually a small computer. The TNC has a microprocessor, RAM, ROM and I/O. The TNC consists of four functional parts: the TNC computer, the TNC 1200 Baud modem, the TNC-to-Color Computer interface and the TNC ROM software.

The TNC computer uses a small eight-bit microprocessor. The MJF-1200 uses a Z80. The Heathkit model HD-4040 uses a 6809. Whichever microprocessor is used, the TNC performs the same basic functions. The user interface is what really matters.

All TNCs have a 1200 Baud modem built into them. This modem produces an analog signal from your CoCo's digital signal and vice versa. The TNC-to-CoCo interface is usually made via an RS-232 link. Run your terminal program and the TNC looks just like your phone modem — almost.

When you connect to the TNC via the CoCo, you actually communicate with the TNC's computer. Most software built into the TNC computer follows the TARP standard. This standard is simply a set of commands used to tell the TNC to connect and disconnect to another node in the network. There are also commands to tell the TNC to perform a host of other tasks. Among them are telling the TNC to monitor all received packets, displaying and setting the time of day, sending beacon text, and far too many more to list here. For a good introduction to Packet Radio see Jim Grubbs' book, *Get *** CONNECTED to Packet Radio.*

There is as much available on Packet Radio as there are nodes to connect to. Packet Bulletin Board Services (PBBS) are popular. A typical PBBS covers a wide geographical area and allows message transfers from one PBBS to the next. If you could not connect to your buddy who is several states away, you might leave him an electronic mail message at his local PBBS. How does it get there? Simple. You connect to your local PBBS, leave him the message and direct the message to be sent to your friend's PBBS. During the early morning hours, your message will be transferred from PBBS to PBBS via the Packet Radio network!

I should mention that almost all the PBBSs run the same software (*WORLI*). This frees you from learning the ins and outs of a new PBBS everytime you connect to a different one. Some PBBSs have gateway functions that allow you to "hop" from one network to another (or, more appropriately, one frequency to another).

Where Is Packet Going From Here?

The new Japanese Amateur Satellite Number One (JAS-1), scheduled to be launched in August 1986, will allow packeters to transfer messages worldwide with only a 120 minute delay. JAS-1 will be a message store and forward system. JAS-1 will also allow packets to be sent in real time (ideal for chatting to friends around the globe).

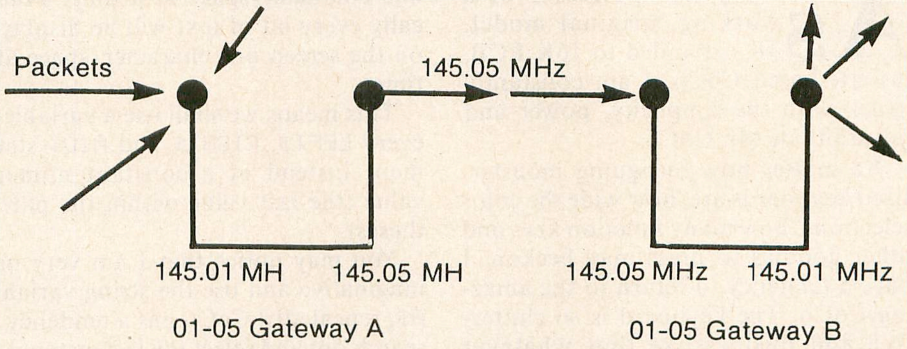


Figure 6: A gateway is two nodes at one location that pass packets from one frequency to another (or one network to another).

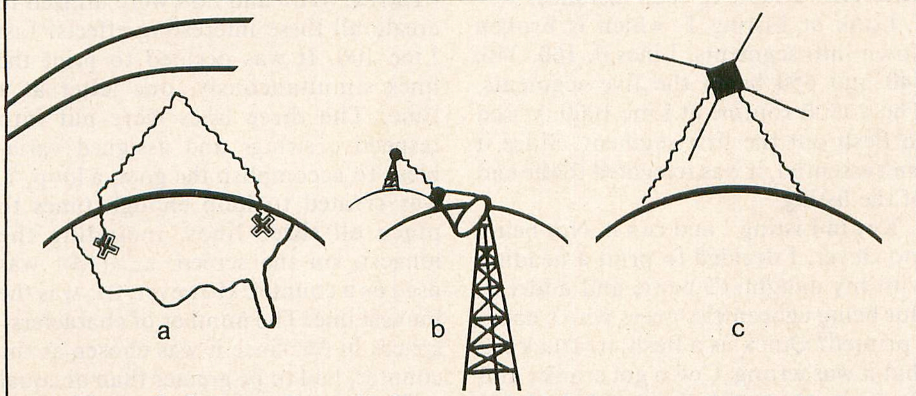


Figure 7: Gateway lines: A) Slow-speed, high-frequency link; B) High-speed microwave data link; C) Satellite data link.

High-speed, land-based gateways will allow many local networks to communicate to distant networks easily. A public Packet Radio network has also been proposed (FCC rule making RM-5241). The future of packet radio is looking very active! If you are a licensed Ham (Technician class or higher), give it a try. If you are a would-be Ham, get out the code practice tapes and the CoCo Morse code simulator software and get going. You might try contacting a local Ham and ask him to give you a demonstration of Packet Radio. I'm sure that's all it will take to keep you awake nights . . . look at me!

BASIC TRAINING **4K**

One Character Space at a Time

By Joseph Kolar
Rainbow Contributing Editor

As the proud possessor of a working, original model, 4K expanded to 16K ECB, cassette-based CoCo, I am constantly struck with the simplicity, power and versatility of Mr. CoCo.

No matter how intriguing monster-sized keyboards are, how wide the color selections, how many function keys and other goodies to press may beckon, I have a tendency to return to the amazing CoCo. The keyboard is so clutter-free and businesslike that whatever perceived or imagined short-comings there may be, it is a joy for the recruit as well as the veteran CoCo nut to sit down and tickle the keys.

Just as a fledgling pilot learns to fly in a Piper Cub rather than a Lear Jet, so, too, will a newcomer learn best from a simple-to-manage computer, rather than an intelligence-insulting, icon-loaded moron machine with a zillion K memory.

In the last tutorial, we worked with `LEFT$`, `RIGHT$` and `MID$`, displaying complete words or lines of print on the screen. The theme for today's lesson is one character/space at a time. Practically every bit of text will be displayed on the screen one character/space at a time.

This means we shall use a variable in every `LEFT$`, `RIGHT$` and `MID$` statement instead of a constant numeric value (the last value within the parentheses).

You may notice that I am very unimaginative and use the string variable, `A$`, repeatedly. CoCo has a tendency to search out and select the last instance of a variable in a listing at the point where it is operating, so this presents no problem. You may prefer to use a different variable in each instance.

Look at Listing 1, which is broken down into segments. Lines 0, 160, 340, 540 and 650 begin the five segments. The `GOSUB` routine at Line 1000 is used to flesh out the first segment. Since it isn't essential, it was relegated to the end of the listing.

Key in Listing 1 and run it. Not being too clever, I decided to print a heading with my daughter's name and address. But being egocentric, guess who's name I printed? Quick as a flash, it struck me that it was wrong. CoCo got cranky and showed me up with the flashing `GOSUB 1000` routine. So, chastised, my name was peeled off, one letter at a time. However, I would not give up center stage. I insinuated my name at the center just like a ham and, having upstaged one and all, strode off the screen.

My daughter's name was printed at the heading, one letter at a time, but rolled up and off the screen. At this point, her husband, Jimy (sic), flashed his name on one letter at a time. However, she was indignant and push came to shove and his name was removed to be triumphantly replaced by her own, which was my original idea. Whew!

Now that you know the story, let's get a more detailed explanation. `LEFT$`, `RIGHT$`, `MID$` and `LEN` were utilized to create all these interesting effects. List Line 100. It was decided to print the lines simultaneously, one letter at a time. The three lines were put into respective strings and assigned variables. To accomplish the goal, a loop, `T`, was created to loop enough times to place all three lines, including the longest, on the screen. `LEN(A$)` was used as a counter. However, `C$`, was the longest line. The number of characters/spaces in `A$`, since it was chosen as the counter, had to be greater than or equal to those in `C$`. This was done simply, but effectively, by adding enough blank spaces into the `A$` string, so that it

---

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

would be a bit longer than the length of C$.

PRINT@ locations were guesstimated on the first three screen rows, to be adjusted as required. LEFT$(A$,T) instructed CoCo to start from the left side of the string, A$, and print a letter, designated by T, at location 10. Then LEFT$(B$,T) told CoCo to put the first letter, '0', at 40, and LEFT$(C$,T) to put the 0th letter, 'S', at 70. A tiny pause followed and then CoCo put on the next trio of letters, where T equals one.

Rather than give you a possibly confusing burst of verbiage, edit Line 90 so 51 becomes 510 and run. Study this slowed down version carefully and rerun it until you can see what is what. Notice how efficiently CoCo tacked on each batch of characters.

In LEFT$(A$,T), T is an ever-increasing single digit number augmented by 1. Try adding STEP2 to Line 5, and run. A jerky presentation results when T equals two characters.

This is an unusual way to produce a three-line heading that you may want to save. A little pizazz goes a long way!

Note that Line 100 could have been zapped and Line 90 could have ended in Z,T. It is not as easy to see the outer loop, T. There is no law saying that you must compress or multiple-statement-line your program to death. Remember, when you run your program, you don't see the listing. You'll never see the debris, such as Line 105, if you forget to kill it.

For the purpose of instruction, the rule for this tutorial is, "one statement — one program line," except for the FOR/NEXT pause loops.

You will notice a lot of lines like Line 101, which are repeated in this listing and the next one. The programs really cry for GOSUB routines and, when you finalize your programs, you may prefer to make appropriate changes.

Restore Line 90 to 51 and drop the STEP2 from Line 5. List Line 105. We pause, have a short trip to the "wrong" GOSUB routine, and then return for another pause. Now delete Line 105. Run it to make sure it was a fossil.

Now, look at the routine in lines 1000 on. What we want to do is flash on "wrong" and blank it out 10 times with a small pause in each loop and then return to continue the tutorial.

My favorite name was replaced by wrong!. Notice that a few spaces were prefixed to wrong!. It was not necessary to suffix any because without an ending semicolon, the rest of the line would be blanked out by CoCo. The blanking line could just as easily begin at Location 10, rather than stingy 13, (Line 1020) to match Line 1009.

Make it a point to try all the minor alternates to see for yourself. Suppose you deleted up to NEXT in lines 1010 and 1030? What would Line 1040 look like? Not very stimulating. Better replace the removed segments of the two lines.

Coming back from the subroutine, we bump into another pause. The name reappears only to be picked off quickly, one letter at a time, beginning from the left side.

List lines 110 to 150. LEN(A$) was assigned a variable. To see what the value is, run it and press BREAK when the name is in process of being deleted from the screen. Type PRINT L and press ENTER. Now you know! The reason you must press BREAK while you are in the target area where L is being processed, is that the variable L is used later for other strings and you might easily pass over into one of those areas and pick up the value of the wrong L.

Itching to try out RIGHT$? Note lines 120 and 130, where everything appears

Listing 1: HEADING

```
0 'LISTING1"
10 CLS
20 A$="JOSEPH KOLAR          "
30 B$="824 NE 56TH ST.
40 C$="SEATTLE, WASHINGTON"
50 FOR T= 0 TO LEN(A$)
60 PRINT@10, LEFT$(A$,T)
70 PRINT@40,LEFT$(B$,T)
80 PRINT@70, LEFT$(C$,T)
90 FOR Z= 1 TO 51:NEXT
100 NEXT
101 FOR Z= 1 TO 500:NEXT
102 GOSUB 1000
104 FOR X= 1 TO 500:NEXT
105 Z$=A$
110 L=LEN(A$)
120 FOR A=L TO 0 STEP-1
130 PRINT@30-A," "RIGHT$(A$,A)
140 FOR B=1 TO 51:NEXT
150 NEXTA
160 '***
210 A$="JOSEPH KOLAR"
220 L=LEN(A$)
230 FOR A=0 TO L
240 PRINT@214-A,LEFT$(A$,A)
250 FOR B=1 TO 200:NEXT
260 NEXT A
300 FOR A=L TO 0 STEP-1
310 PRINT@202,RIGHT$(A$,A)
320 FOR B=1 TO 200:NEXT
330 NEXT A
340 '***
400 A$="BETTY ANN WHITE"
410 FOR T= 0 TO LEN(A$)
420 PRINT@8,LEFT$(A$,T)
430 FOR Z= 1 TO 50:NEXT
440 NEXT
450 FOR Z= 1 TO 500:NEXT
490 L=LEN(A$)
500 FOR A=L TO 0 STEP-1
510 'PRINT@8,RIGHT$(A$,A)
511 PRINT@8,LEFT$(A$,A)
520 FOR B=1 TO 200:NEXT
530 NEXT A
535 FOR Z= 1 TO 500:NEXT
540 '***
600 A$="JIMY OWEN WHITE"
605 PRINT@8,A$
606 FOR Z= 1 TO 200:NEXT
610 FOR T= LEN(A$) TO 0 STEP-1
620 PRINT@8,LEFT$(A$,T)
630 FOR X= 1 TO 200:NEXT
640 NEXT T
```

to be backward. `RIGHT$(A$,A)` can be defined similarly to `LEFT$(A$,A)`, where `RIGHT$(A$,A)` signifies that in the string `A$`, beginning from the right end, count `A` characters.

We expect to use `RIGHT$` to put on the characters, `A`, one at a time (`STEP-1`). Note carefully, if we are using `RIGHT$` in Line 120, `0` is the rightmost character, proceeding letter after letter `STEP-1`, until the leftmost character `L` is reached.

In effect, we are using `RIGHT$` from left to right exactly opposite from the way it is ordinarily used to mimic `LEFT$`'s action.

In order to find our `PRINT@` location for the first letter, `30-A` (the last character is the first to be removed), the character is removed by the blank space, `" "`, and `RIGHT$(A$,A)` tells CoCo which `A` value is to be blanked out.

It might be wise to change `51` to `510` in Line 140 to see this operation proceed slowly. To visualize it more readily, temporarily add the line `132 PRINT@0,A;`. Since the `A$` string is in Line 20, it contains the extra blanks which are harmless and go unnoticed. Now run your work.

To make `RIGHT$` pull it from the rightmost position to the leftmost, mask Line 130 with a `REM`. Add the line `131 PRINT@9," "+RIGHT$(A$,A)`. Run it and delete Line 132.

Did you note that Line 130 removed the name one letter at a time going from right to left, and Line 131 pulled the letters away through a single location, 9, one at a time?

Now, we can get silly. Mask lines 120 and 131. Unmask Line 130. Add 121 `FOR A = TO L` and run. This displays the line one letter at a time, last letter first, working leftward.

Finally, mask Line 130 and unmask Line 131. Can you guess what will happen? Run it and see.

The line was pushed backward, out of the hole at location 9. Change `510` back to `51` in Line 140. Forget about these last two cockeyed presentations — unmask lines 120 and 130 and either mask or delete lines 121 and 131.

List lines 210 to 330. In Line 210, we changed string `A$` by looping off all the trailing blank spaces (Line 20). We assigned a variable, `L`, to the length of `A$`. In a loop, using `LEFT$`, we pulled the name out of a hole, Location 214, and dragged it leftward until it was completely displayed, pausing for a reasonable time lapse to evoke a smooth, banner-like motion.

Immediately, through the hole at Location 202, we stuffed it down by using `RIGHT$` to maintain our leftward direction, letter by letter, until the entire name vanished down the rat hole.

You may want to return to this part of the program and pull it back out of the hole at Location 202, drag it rightward and bury it at Location 214. You can do it! An answer is given at the end of the tutorial.

List lines 400 to 535. `A$` is a new string, which is placed on the screen using `LEFT$`, beginning at Location 8. `T` is incremented by +1, from 0 up to the value of the last letter of the string. After a pause, it places each succeeding letter in the next available space heading rightward. A long pause sets the completed name in place. Then, assigning `L` as the length of the string, from the last letter back to the first, the name is rolled up and off the screen using `LEFT$` (Line 511).

If Line 510 is unmasked and Line 511 is masked, using `RIGHT$`, the name is removed by being pulled through the hole at Location 8.

```
650 '***
700 A$="BETTY ANN WHITE"
710 FOR T=0 TO 15
720 PRINT@8,LEFT$(A$,T)
730 FOR X=1 TO 200:NEXT
740 NEXT T
750 GOTO 750
1000 '
1005 FOR X= 1 TO 10
1009 PRINT@10,"   WRONG!"
1010 FOR Z= 1 TO 20:NEXT
1020 PRINT@13,"         "
1030 FOR Z= 1 TO 20:NEXT
1040 NEXTX
1050 RETURN
```

Listing 2: HOMEWORK

```
0 '<LISTING2>
5 CLEAR 500
10 CLS
20 A$="BETTY ANN WHITE"
30 B$="824 NE 56 ST.
40 C$="SEATTLE, WASHINGTON"
41 PRINT@8,LEFT$(A$,5);:FORZ=1TO
200:NEXTZ
42 PRINT MID$(A$,6,5);:FORZ=1 TO
 200:NEXTZ
43 PRINTRIGHT$(A$,5)
44 FOR Z= 1 TO 500:NEXT
45 CLS
46 '***
47 A$="JOSEPH KOLAR             "
50 FOR T= 0 TO LEN(A$)
60 PRINT@9, LEFT$(A$,T)
70 PRINT@41,LEFT$(B$,T)
80 PRINT@70, LEFT$(C$,T)
90 FOR Z= 1 TO 51:NEXT
100 NEXT
101 FOR Z= 1 TO 500:NEXT
102 GOSUB 2000
103 PRINT@9,A$
104 FOR Z= 1 TO 500:NEXT
110 L=LEN(A$)
120 FOR A=L TO 0 STEP-1
130 PRINT@30-A," "RIGHT$(A$,A)
140 FOR B=1 TO 51:NEXT
150 NEXTA
160 '***
210 A$="JOSEPH KOLAR"
220 L=LEN(A$)
230 FOR A=0 TO L
240 PRINT@213-A," "+LEFT$(A$,A)
```

TANDY®... Better Again.™

The New Color Computer 3

More colors, superb graphics, greater power for only $219⁹⁵

Files
Folder
Disk
Programs in folder 4
Calendar
Filer
Telecom
Text
Paint
TANDY
KIDWRITER

Introducing Radio Shack's newest, most advanced version of our famous Color Computer. The Color Computer 3 (26-3334) is great for small business and home applications such as education, programming, budgets, word processing, graphics, entertainment and more.

The powerful Color Computer 3 comes with 128K memory (expandable to 512K), giving you greater programming and data processing power. With an optional high-resolution color monitor (like our new CM-8), you can create razor-sharp charts, graphs, or just-for-fun doodles and sketches with a palette of 64 brilliant colors. The special graphics mode lets you paint 160 × 192 or 320 × 192 resolution graphics using 16 colors, or 640 × 192 resolution with 4 colors.

The Color Computer 3's Extended BASIC features 21 new commands that allow you to alternate screens, colors, and backgrounds at a higher resolution and in a greater variety of colors than any previous Color Computer.

Best of all, the new Color Computer 3 is compatible with software and accessories designed for the Color Computer 2, including a library of educational, personal-management and game programs. And it's easy to expand with disk drives, printer, modem, and more.

Visit your local Radio Shack today for a demonstration!

Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

Send me an RSC-17 Catalog

Mail To: Radio Shack, Dept. 87-A-707
300 One Tandy Center, Fort Worth, TX 76102

Name ____________________
Address ____________________
City ____________________
ZIP ____________________
Phone ____________________

Price applies at Radio Shack Computer Centers and participating stores and dealers. Monitor, disk drives, Program Paks and printer sold separately.

"Push your name in one direction and when it vanishes, pull out your mate's name from the rat hole and shoot it back across the screen."

List lines 600 to 640. The spot-usurping spouse, using the same string variable, `A$`, quickly slaps his name in the slot. It doesn't take long to kick him out of the area using `LEFT$` by pecking away at his name going from right to left. Note Line 610. It is equivalent in form to lines 490 and 500 combined into one program line. If it were in two lines, it would read: `610 L=LEN(A$)` and `611 FOR T=L TO 0 STEP-1`.

Finally, triumphant, she put her name firmly in the header slot in the simplest manner by using the old faithful `A$` as the string variable containing her name, counting the characters/spaces in her name, putting them into the `FOR` loop as `T` and using `LEFT$`, placing it on the screen, beginning at Location 7.

Here is a solution to the problem mentioned before. Add lines:

```
331 FOR A=0 TO L:PRINT@202,RIGHT$(A$,A): FOR B=1 TO 200: NEXT B,A

332 FOR A=L TO 0 STEP-1:PRINT@214-A," "LEFT$(A$,A): FOR B=1 TO 200: NEXTB,A
```

If you have a problem, check lines 510 and 511 to see if the proper one is unmasked. To produce a faster, repeated push-pull banner, add `200 FOR C=1 TO 10` and add `,C` to the end of Line 332.

In lines 250, 320, 331 and 332, change the pause value from `200` to `50`.

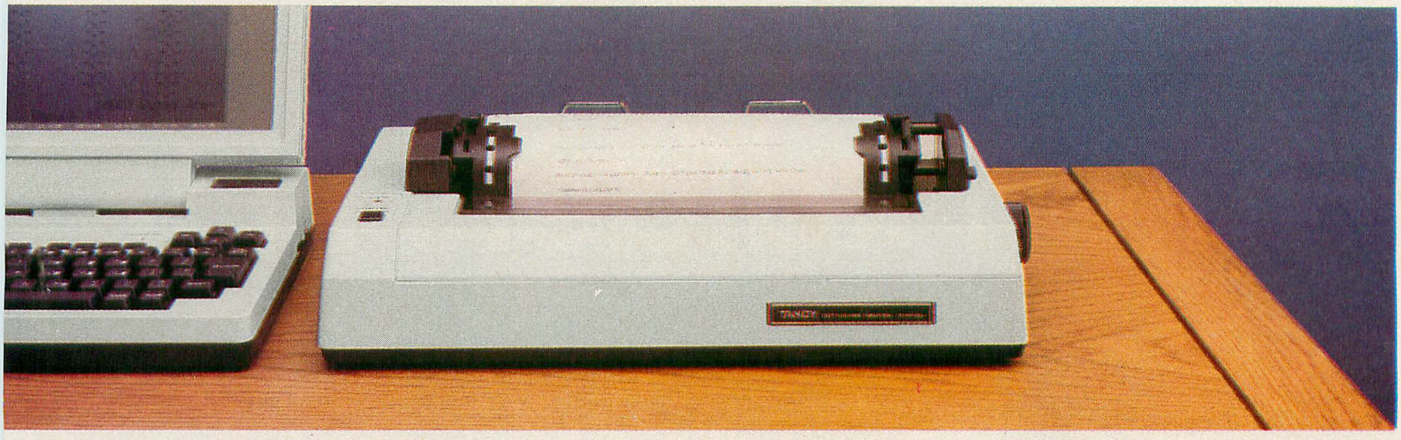
Here's an idea — push your name in one direction and when it vanishes, pull out your mate's name from the rat hole and shoot it back across the screen. You get a nice domestic quarrel effect.

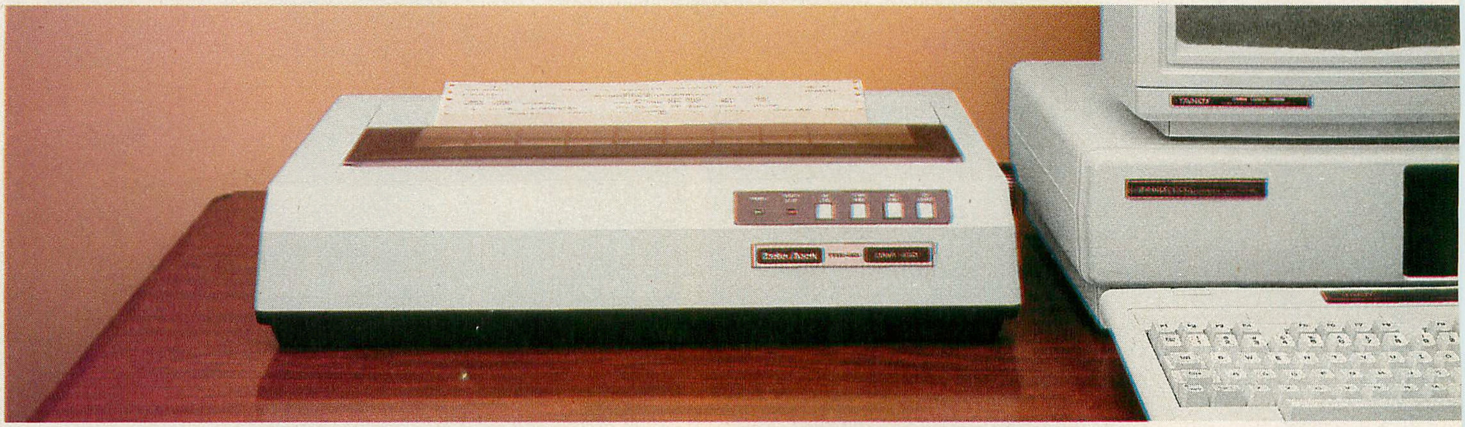
Note that in some instances, as in lines 130 and 332, a blanking space was required. Remove each and check out the sorry state of affairs.

Listing 2 is a homework assignment. It is one half of a demo program. Make sure you save it on tape. The other half will be a continuation of this listing. It is similar to Listing 1 but not quite. It is hoped that you crack open your notebook and analyze the listing. If you find any of the routines useful, you may want to put them into your Reference Notebook. □

```
250 FOR B=1 TO 200:NEXT
260 NEXT A
270 FOR Z=1TO500:NEXT
300 FOR A=L TO 0 STEP-1
310 PRINT@202,RIGHT$(A$,A)
320 FOR B=1 TO 200:NEXT
330 NEXT A
340 '***
400 A$="BETTY ANN WHITE"
410 FOR T= 0 TO LEN(A$)
420 PRINT@8,LEFT$(A$,T)
430 FOR Z= 1 TO 50:NEXT
440 NEXT
450 FOR Z= 1 TO 1000:NEXT
460 '***
490 L=LEN(A$)
500 FOR A=L TO 0 STEP-1
510 'PRINT@8,RIGHT$(A$,A)
511 PRINT@8,LEFT$(A$,A)
520 FOR Z=1 TO 200:NEXT
530 NEXT A
535 FOR Z= 1 TO 500:NEXT
540 '***
600 A$="JIMY OWEN WHITE"
605 PRINT@8,A$
606 FOR Z= 1 TO 500:NEXT
610 'FOR T= LEN(A$) TO 0 STEP-1
611 FOR T=0 TO LEN(A$)
620 PRINT@8,LEFT$(A$,T)
630 FOR X= 1 TO 200:NEXT
640 NEXT T
650 FOR Z= 1 TO 500:NEXT
660 '***
700 A$="BETTY ANN WHITE"
710 FOR T=0 TO 15
720 PRINT@8,RIGHT$(A$,T)
730 FOR X=1 TO 200:NEXT
740 NEXT T
750 FOR Z= 1 TO 500:NEXT
800 '***
810 B$="JIMY OWEN WHITE"
811 L=LEN(B$)
820 FOR A= 0 TO L
830 PRINT@22-A," "+LEFT$(B$,A)
840 FOR X= 1 TO 200:NEXT
850 NEXT A
860 FOR Z=1TO500:NEXT
2000 '
2010 FOR X= 1 TO 10
2020 PRINT@9,"   WRONG!"
2030 FOR Z= 1 TO 20:NEXT
2040 PRINT@12,"         "
2050 FOR Z= 1 TO 40:NEXT
2060 NEXTX
2070 RETURN
```

Next to your computer,





nothing beats a Tandy® printer.

High print quality—for less!

Complete your system with the right printer for your home or office. Tandy printers offer the fine print quality, graphics and high performance you need—at an affordable price.

Versatile business printer

The DMP 430 (26-1277, $699) is a 132-column dot-matrix printer with an 18-wire print head that delivers superior correspondence characters in a single pass. Choose from micro, italic and double-high fonts, as well as bit-image graphics. In the draft mode, the DMP 430 delivers a fast 180 characters per second. IBM® PC compatible.

Our low-cost, triple-mode personal printer

The DMP 130 (26-1280, $349.95) allows you to choose from word processing, data processing and dot-addressable graphics. Prints in four character styles: standard or italic cursive, in draft or correspondence modes. IBM® PC compatible.

In business…for business

For the best value and selection in top-quality printers, shop your local Radio Shack Computer Center.

Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

Send me a new
RSC-17
Computer Catalog.

Mail To: Radio Shack
Dept. 87-A-706
300 One Tandy Center
Fort Worth, TX 76102

Name ______________________
Company ______________________
Address ______________________
City ______________________
State ____________ ZIP ____________
Phone ______________________

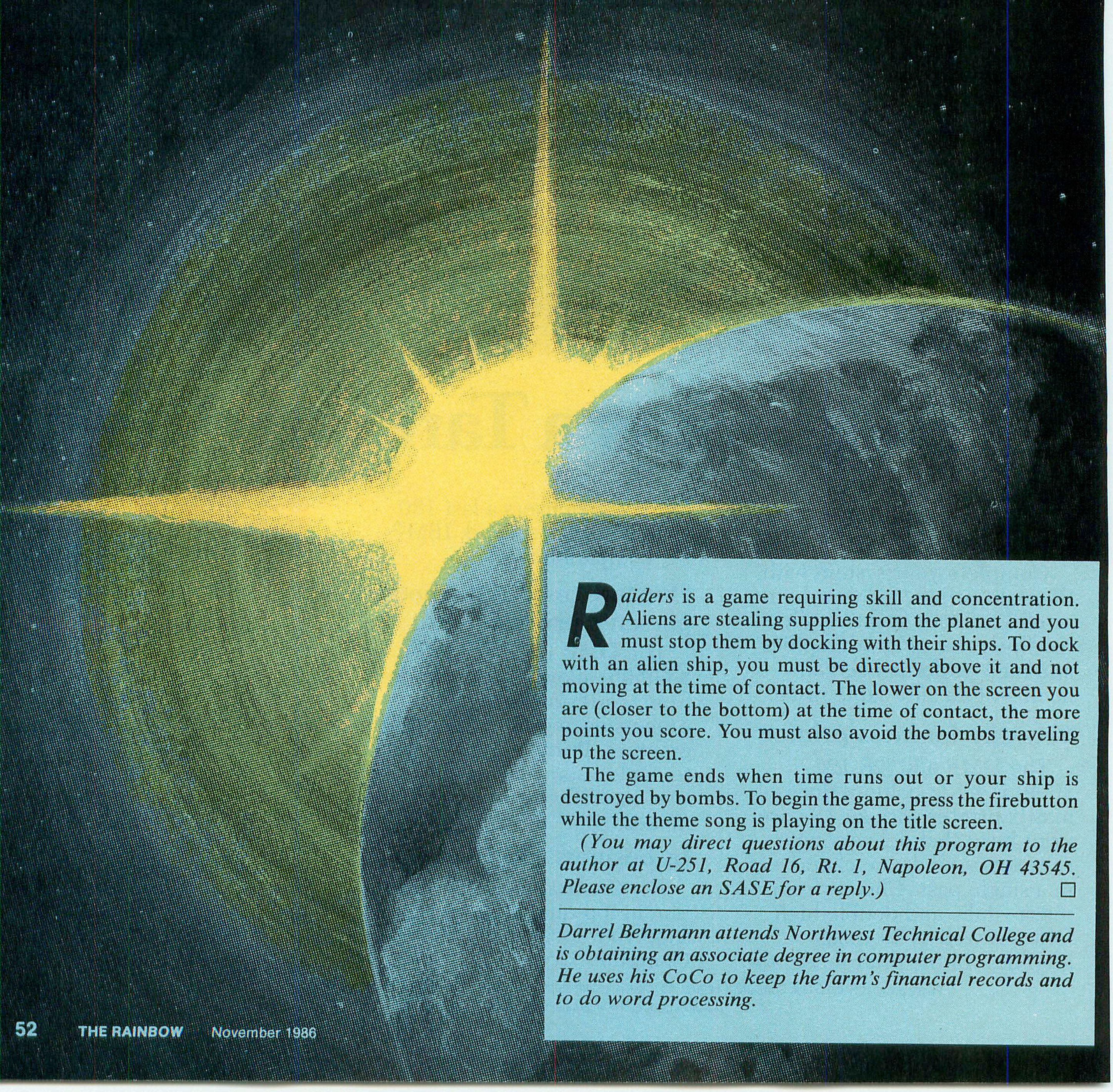
Prices apply at Radio Shack Computer Centers and at participating stores and dealers. The DMP 430 requires special order at some locations.
IBM/Registered TM International Business Machines Corp.

16K ECB

RAINBOW ON DISK
the RAINBOW

Alien Raiders Blitz

By Darrel Behrmann



Raiders is a game requiring skill and concentration. Aliens are stealing supplies from the planet and you must stop them by docking with their ships. To dock with an alien ship, you must be directly above it and not moving at the time of contact. The lower on the screen you are (closer to the bottom) at the time of contact, the more points you score. You must also avoid the bombs traveling up the screen.

The game ends when time runs out or your ship is destroyed by bombs. To begin the game, press the firebutton while the theme song is playing on the title screen.

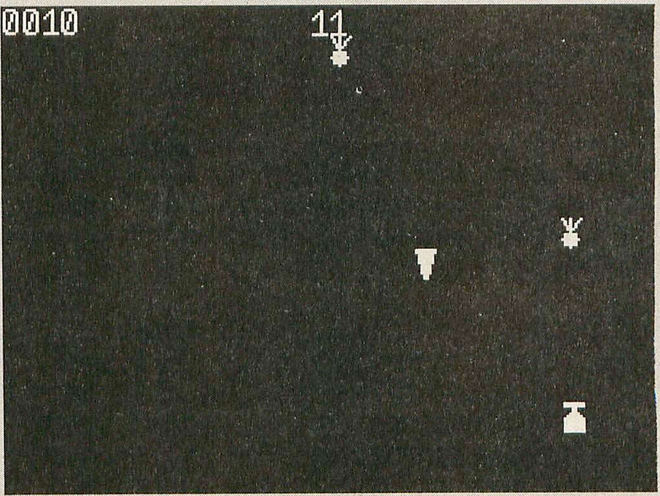
(You may direct questions about this program to the author at U-251, Road 16, Rt. 1, Napoleon, OH 43545. Please enclose an SASE for a reply.) ☐

Darrel Behrmann attends Northwest Technical College and is obtaining an associate degree in computer programming. He uses his CoCo to keep the farm's financial records and to do word processing.

26	110
40	180
58	69
74	246
95	70
END	254

The listing: RAIDERS

```
1 '*****************************
2 '*         RAIDERS           *
3 '*            BY             *
4 '*     DARREL BEHRMANN       *
5 '*    U-251 RD. 16 RT. 1     *
6 '*    NAPOLEON, OH 43545     *
7 '*      JANUARY, 1986        *
8 '*****************************
9 POKE65495,0
10 CLEAR 500
11 DIM EM(8,12),CS(8,12),SS(8,12
),AN$(15)
12 GOSUB 95'GET LETTERS
13 PMODE4,1:PCLS0:SCREEN1,1:PMOD
E3,1
14 COLOR3,4
15 LINE(0,165)-(255,192),PSET,BF
16 LINE(10,164)-(10,104),PRESET
17 LINE-(40,94),PRESET
18 LINE-(70,104),PRESET
19 LINE-(70,164),PRESET
20 LINE-(10,164),PRESET
21 PAINT(40,104),4,4
22 LINE(30,84)-(50,104),PRESET,B
F
23 LINE(10,74)-(70,84),PRESET,BF
24 CIRCLE(110,154),10,4
25 CIRCLE(150,154),10,4:CIRCLE(1
75,154),10,4
26 PAINT(110,154),2,4:PAINT(150,
154),2,4:PAINT(175,154),2,4
27 DRAW"BM80,155;C3U10R10E15R90D
25L115"
28 PAINT(90,150),3,3
29 LINE(105,135)-(125,145),PRESE
T,B
30 PAINT(120,140),2,4
31 DRAW"BM16,50;S16C2"+AN$(14)+A
N$(10)+AN$(13)+AN$(11)+AN$(12)+A
N$(14)+AN$(15)
32 DRAW"C4S4"
33 IFPEEK(65280)<>126 AND PEEK(6
5280)<>254THENPLAY"T12L1O2ABD":I
FPEEK(65280)<>126 AND PEEK(65280
)<>254THENPLAY"L2CFO1ABDL2CF":GO
TO33
34 PLAY"V10T255L255"
35 PMODE4,1:PCLS0
36 CIRCLE(3,8),3,5:LINE(0,0)-(3,
5),PSET:LINE(3,0)-(3,5),PSET:LIN
E(7,0)-(3,5),PSET:PAINT(3,8),5,5
37 GET (0,0)-(7,11),EM
38 PCLS0
39 LINE(0,0)-(7,1),PSET,BF:LINE(
3,2)-(4,3),PSET,BF:LINE(3,3)-(0,
6),PSET:LINE-(0,11),PSET:LINE-(7
,11),PSET:LINE-(7,6),PSET:LINE-(
4,3),PSET:PAINT(3,9),5,5
40 GET(0,0)-(7,11),CS
41 PCLS0
42 LINE(0,0)-(3,11),PSET:LINE-(4
,11),PSET:LINE-(7,0),PSET:LINE-(
0,0),PSET:PAINT(3,3),5,5
43 GET(0,0)-(7,11),SS
44 PCLS0
45 POKE65495,0:PH=16:PV=1:E1=0:E
2=0:G1=0:G2=0:SC=0
46 SCREEN1,1:PCLS0:TIMER=0
47 LINE(PH*8,PV*12)-(PH*8+7,PV*1
2+11),PRESET,BF
48 J=JOYSTK(0):J1=JOYSTK(1):GOSU
B87
49 IFJ<15THENPH=PH-1ELSEIFJ>45TH
ENPH=PH+1
50 IFJ1<15THENPV=PV-1ELSEIFJ1>45
THENPV=PV+1
51 IFPH>31THENPH=31ELSEIFPH<0THE
NPH=0
52 IFPV>15THENPV=15ELSEIFPV<1THE
NPV=1
53 PUT(PH*8,PV*12)-(PH*8+7,PV*12
+11),SS
54 IFE1=0ANDRND(5)=5THENE1=1:H1=
RND(32)-1:V1=15
55 IFE2=0ANDRND(5)=5THENE2=1:H2=
RND(32)-1:V2=15
56 IFE1=1THENLINE(H1*8,V1*12)-(H
1*8+7,V1*12+11),PRESET,BF
57 IFE2=1THENLINE(H2*8,V2*12)-(H
2*8+7,V2*12+11),PRESET,BF
58 V1=V1-1:IFV1<1THENE1=0
```



```
59 V2=V2-1:IFV2<1THENE2=0
60 IFE1=1THENPUT(H1*8,V1*12)-(H1
*8+7,V1*12+11),EM
61 IFE2=1THENPUT(H2*8,V2*12)-(H2
*8+7,V2*12+11),EM
62 IF (V1=PV OR V1-1=PV) AND H1=
PH THEN GOSUB 76
63 IF (V2=PV OR V2-1=PV) AND H2=
PH THEN GOSUB 76
64 IFG1=0ANDRND(10)=10THENG1=1:H
3=RND(32)-1:V3=15
65 IFG2=0ANDRND(10)=10THENG2=1:H
4=RND(32)-1:V4=15
66 IFG1=1THENLINE(H3*8,V3*12)-(H
3*8+7,V3*12+11),PRESET,BF
67 IFG2=1THENLINE(H4*8,V4*12)-(H
4*8+7,V4*12+11),PRESET,BF
68 V3=V3-1:IFV3<1THENG1=0
69 V4=V4-1:IFV4<1THENG2=0
70 IFG1=1THENPUT(H3*8,V3*12)-(H3
*8+7,V3*12+11),CS
71 IFG2=1THENPUT(H4*8,V4*12)-(H4
*8+7,V4*12+11),CS
72 IF V3-1=PV AND H3=PH THEN GOS
UB79
73 IF V4-1=PV AND H4=PH THEN GOS
UB79
74 GOSUB 81
75 GOTO 47
76 PLAY "V1":FORY=1TO30:PLAY"ABA
V+;":CIRCLE(PH*8+4,PV*12-4),RND(
15),RND(4):NEXTY:PLAY"V31":FORY=
1TO30:PLAY"CDCV-;":CIRCLE(PH*8+4
,PV*12-4),RND(15),RND(4):NEXTY
77 PLAY "V10"
78 GOTO 94
79 SC=SC+PV:SOUND PV*16,1
80 RETURN
81 'SCORING DISPLAY
82 PLAY "AABB"
83 LINE(0,0)-(32,12),PRESET,BF
84 TH=INT(SC/1000):HD=INT((SC-TH
*1000)/100):TN=INT((SC-TH*1000-H
D*100)/10):OE=SC-TH*1000-HD*100-
TN*10
85 DRAW "BM0,11;"+AN$(TH)+AN$(HD
)+AN$(TN)+AN$(OE)
86 RETURN
87 'TIMER DISPLAY
88 LINE(120,0)-(136,12),PRESET,B
F
89 TI=100-TIMER/60
90 TN=INT(TI/10):OE=TI-TN*10
91 IF TIMER/60 >100 THEN GOTO 94
92 DRAW"BM120,12;"+AN$(TN)+AN$(O
E)
93 RETURN
94 POKE65494,0:IF PEEK(65280)=12
6 OR PEEK(65280)=254 THEN 45 ELS
E 94
95 AN$(0)="BE1BU1U7E1R3F1D7G1L3U
1E1U2E1U2E1BD9BR3"'0
96 AN$(1)="BE1R5L2U9G3BD7BR6"'1
97 AN$(2)="BU8BR1E2R2F1D2G2L1G2D
2R6BF1"'2
98 AN$(3)="BE1BU1F1R2E2U2H1NL3E1
U2H1L3G2BD8BR8"'3
99 AN$(4)="BU9BR1D3R5L1U4D9BD1BR
3"'4
100 AN$(5)="BE1BU1F1R2E2U2H1L1H1
L1H1U2R6BD10BR1"'5
101 AN$(6)="BE2BU2E1R2F1D2G1L2H2
U5E1R1E1R1F1BD9BR2"'6
102 AN$(7)="BU8BE1E1R4D2G1D2G1D3
BD1BR4"'7
103 AN$(8)="BR3BU1H2U1E2H2E2R1F2
G2F2D1G2BD1BR4"'8
104 AN$(9)="BR5BU1U9L3G1D2F1R3BR
3BD6"'9
105 AN$(10)="BE1U4E1U3E1R1F1D3F1
NL4D4BF1BR1"'A
106 AN$(11)="BE1U9R2F1R1F1D5G1L1
G1L2BD1BR7"'D
107 AN$(12)="BE1U9R5L5D4R3L3D5R5
BD1BR2"'E
108 AN$(13)="BE1R5L3U9L2R5BD10BR
2"'I
109 AN$(14)="BE1U9R3F2D1G2L2F4BF
1BR1"'R
110 AN$(15)="BE1BU1F1R2E2U1H2L1H
2E2R2F1BD9BR2"'S
111 RETURN
```

Hint . . .

Cursory Change

Here is a little routine that alters the cursor in an interesting way. Type it in and give it a try. You may want to do a little disassembly (a manual one, that is) and apply the technique to other areas of Color Computing.

```
10 DATA 26,80,142,128,0,166,132,
183,255,223,167,128,140,224,0,39
,5,183,255,222,32,239,28,175,57
20 FORA=3072 TO 3096: READB:POKE
A,B:NEXTA:EXEC3072
30 FOR A=1 TO 255:POKE 41384,A
40 NEW
```

Jim Knoppow
Kent, WA

A fix to use the Old-Time Banner Printer with a disk system

The Old-Time Fix

By Horace D. Vaughn

When I opened my May 1986 issue of RAINBOW, I was disappointed to find that the *Old-Time Banner* program [Page 150] would not work with my disk system. I set out to solve this situation and will now share it with the rest of the CoCo Community.

First, if you haven't done so already, save a copy of the *Banner* program on tape using the procedures mentioned in the article. Now, unplug the disk drive from the cartridge port. Then type `POKE 25,6:NEW`. Load in the *Banner* program and delete all lines from 101 on. Save this to another tape as *BAN1*.

Reload the original banner program. This time, delete all lines up to and including Line 100. Also, delete lines 160, 998 and 2008. Move the last `PRINT#J, Y$P$B$R$D$U$N$D$T$V$Z$` statement in Line 117 to the beginning of Line 118. Save this version to tape as *BAN2*.

Plug the disk controller back into the computer and enter `POKE 25,14:POKE 3584,0:NEW`.

Load *BAN1* from tape and save it to disk as *"BAN1/BAS",A*. Load *BAN2* from tape and save it to disk as *"BAN2/BAS",A*. Type in, save to disk and run *Shorten*.

The first time through *Shorten* use BAN1/BAS as the input filename and BAN11/BAS as the output filename. Run *Shorten* again, but this time use BAN2/BAS as the input filname and BAN22/BAS for the output filename. Now load BAN11/BAS from the disk. Type `MERGE"BAN22/BAS"`. This creates a shortened version of the *Banner* program in memory. It might be wise before we start editing things for you to save this to disk as *BANNER/BAS*.

Now comes the fun part. If you don't have much experience, you may want to brush up on the `EDIT` command of Extended BASIC, but what we will be doing isn't really all that difficult.

At the beginning of Line 1, add `FORX=1TO3:PRINT#J,YY$X$Z$:NEXT:`. Add `$Z$` to the end of lines 16 and 1070. Add `:GOTO1` to the end of Line 159. Change Line 161 to read `FORX=1TO12:PRINT#J,YY$X$Z$:NEXT:GOTO1`. Add `:YY$=Y$:Y$=Y$+V$` to the end of 2028. Add `FORX=1TO6:PRINT#J,YY$X$Z$:NEXT:` to the beginning of Line 2034.

The changes should now be complete. Resave this program to disk as *BANNER/BAS*. Always remember to use `POKE25,14:POKE3584,0:NEW` before running the program. Happy "bannering" with disk!

Horace Vaughn is a retired Navy chief, presently employed as a marine electrician in Virginia Beach. He has been programming on the CoCo for four years.

(You may direct your questions about this modification to Mr. Vaughn at 4824 Peach Creek Lane, Virginia Beach, VA 23455, 804-499-1741. Please enclose an SASE when writing.) □

The listing: SHORTEN

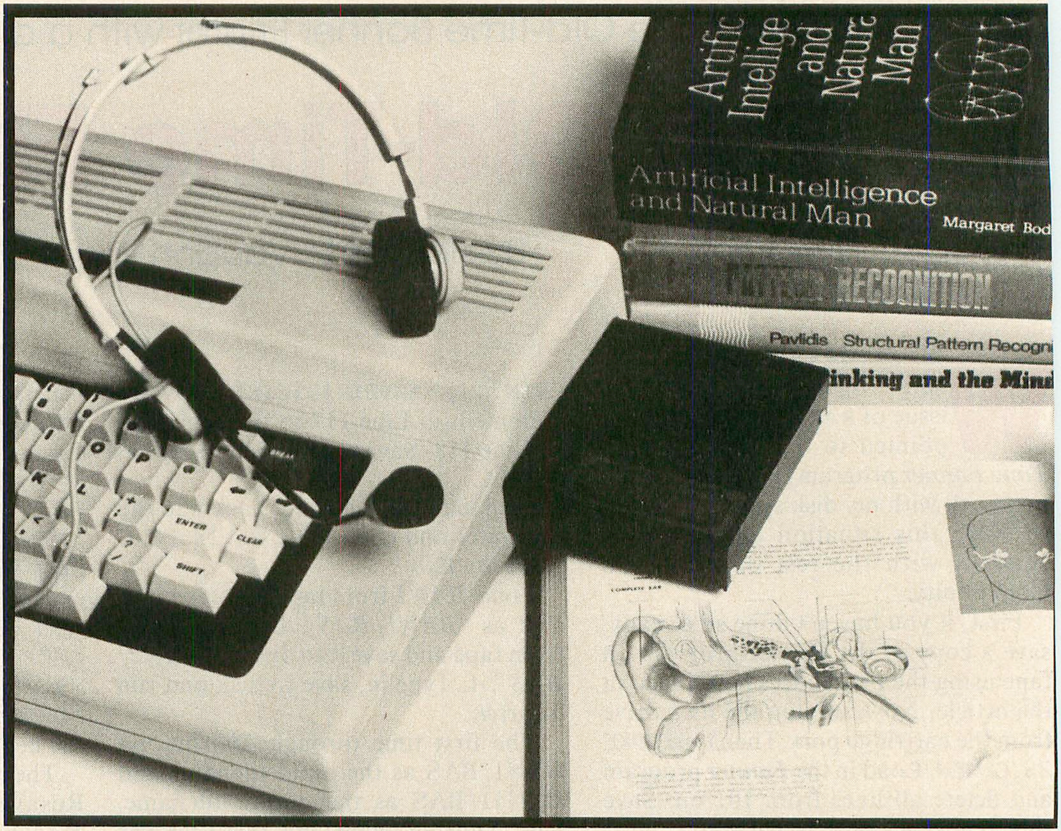
```
10 'SHORTEN FOR BANNER MAY 1986
RAINBOW
20 'BY H.D.VAUGHN
30 '4824 PEACHCREEK LN.
40 'VA.BEACH VA. 23455
50 CLEAR1000:CLS
60 INPUT"INPUT FILENAME/EXT=====
========>";DF$
70 INPUT"OUTPUT FILENAME/EXT====
========>";DO$
80 OPEN"I",#1,DF$:OPEN"O",#2,DO$
90 IF EOF(1)= -1 THEN 180
100 LINE INPUT#1,D$
110 CLS:PRINTD$
120 FOR X=5TO LEN(D$)
130 IF MID$(D$,X,3)="J,Y"THEN190
140 IF MID$(D$,X,3)="998"THEN210
150 NEXT X
160 PRINT #2,D$
170 GOTO90
180 CLOSE:END
190 IF MID$(D$,X+4,1)="V"THEN220
200 L$=LEFT$(D$,X+2):R$=RIGHT$(D
$,LEN(D$)-X-2):D$=L$+"Y"+R$:GOTO
230
210 L$=LEFT$(D$,X-16):R$=RIGHT$(
D$,LEN(D$)-X-8):D$=L$+R$:X=X-10:
GOTO230
220 L$=LEFT$(D$,X+3):R$=RIGHT$(D
$,LEN(D$)-X-5):D$=L$+R$
230 CLS:PRINTD$:GOTO150
```

Now Your Computer Can Listen To You!

EARS™

Electronic
Audio
Recognition
System

$99.95


Artificial Intelligence and Natural Man
Margaret Bod
PATTERN RECOGNITION
Pavlidis Structural Pattern Recogn
inking and the Mind
ENTER
CLEAR
SHIFT

- SPEECH RECOGNITION
- HANDS OFF PROGRAMMING
- HIGH QUALITY SPEECH REPRODUCTION

EARS Does It All!

INCREDIBLE!

Two Years In the Making. Speech Systems was formed to develop new and innovative speech products. After 2 years of intensive Research and Development, we have created a truely sophisticated speech recognition device. Recognition rates from 95% to 98% are typical. Until now, such a product was outside the price range of the personnel computer market, and even small businesses.

EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

Speech and Sound Recognition. EARS is really a sound recognition system, so it really doesn't matter whether you speak in English, Spanish, or French. In fact you do not have to speak at all, you can train EARS to understand sounds such as a musical note or a door slamming.

Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call **(312) 879-6844**, you won't believe your ears or our EARS.

DISK OWNERS. EARS will work with any disk system with either a MULTI-PAK or Y-CABLE. Our new Triple Y-CABLE was specifically developed for those wishing to add SUPER VOICE as a third device.

You Get Everything You Need. You get everything you need including a specially designed professional headset style noise cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE $20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for $59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save $20.

VOICE CONTROL

Applications for EARS are astounding. Here is our first of many listening programs to come. VOICE CONTROL is a program specifically designed to allow you to control any appliance in your house with your voice and our HOME COMMANDER (sold separately) or the Radio Shack Plug 'N' Power controller. For example, you can control your TV by saying "TV ON" or "TV OFF". . **$24.95**

FREE BLANK DISK OR TAPE WITH EVERY ORDER

VISA® MasterCard

Dealer Inquiries Invited

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (TO ORDER)

CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL

'SUPER VOICE' T.M.

COCO'S MOST ADVANCED SPEECH SYNTHESIZER.

IT TALKS, SINGS AND MORE.

only . . . $79.95

WITH EARS PURCHASE

only . . . $59.95

musical applications of microprocessors

SUPER VOICE is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. SUPER VOICE is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned SUPER VOICE into a monophonic Super Music Synthesizer with our PIANO KEYBOARD.

IT TALKS. A free TRANSLATOR text-to-speech program makes writing your own talking program as easy as SAYING "HELLO."

SUPER VOICE works in any 32K or 64K computer. A disk system requires a Y-Cable or Multi-Pak.

FREE
"REACTION"
To Test Your
Reflexes

FREE
SUPER VOICE
SINGS THE
STAR SPANGLED
BANNER

FREE
"SIMON"
To Test Your
Memory

Here are the facts; the decision is yours.

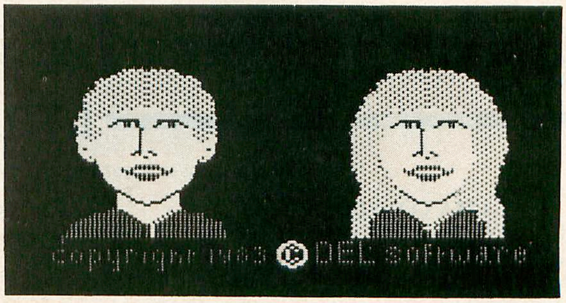
	SUPER VOICE	REAL TALKER	RS SPEECH CARTRIDGE	VOICE-PAK
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4096 (32 absolute levels with 8 inflection speeds)	4	1	4

SAVE $24.95

FREE

SUPER TALKING HEADS

Paul and Pauline, our talking heads program is normally $24.95. Until Dec. 15 we will include them with each SUPER VOICE order.



FREE
BLANK DISK
OR TAPE
WITH EVERY
ORDER

VISA® MasterCard

Dealer Inquiries
Invited

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W 255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (TO ORDER)
1 MEGABYTE COLORAMA (312) 879-6811 (24 HR. BBS)

CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OR BBS.

Introducing

Lyra™

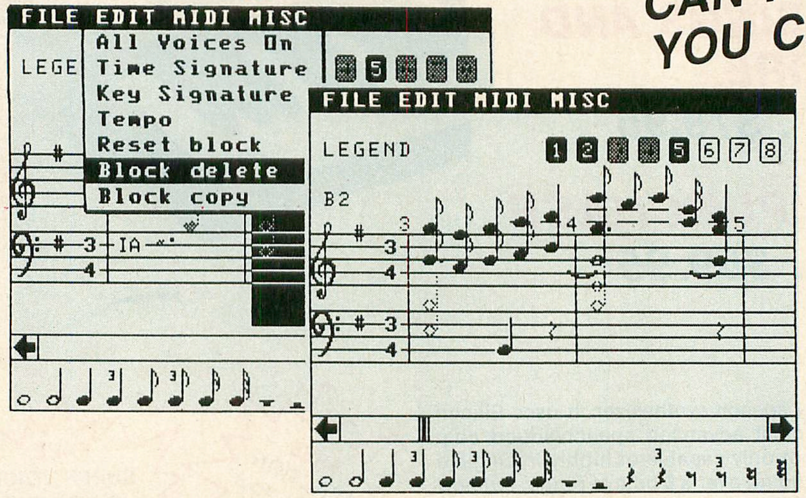
The Musica Coco Max™

IF YOU CAN POINT, YOU CAN COMPOSE

PULL DOWN MENUS

ICONS!

A MUST FOR MIDI USERS



LYRA is the most powerful music composition program we have seen on any computer. We don't mean just the COCO, we really mean any computer. Whether you are a novice trying to learn music or a professional musician with MIDI equipment you will find LYRA a powerful tool. You see, we wrote LYRA for musicians that hate computers. If you want proof, purchase a LYRA demo for $7.95. We will apply the demo price to your purchase. MIDI output requires the LYRA MIDI cable (#MC158) or COCO MIDI Seq/Editor (#CM147).

- ✓ Ultra Easy to use, just point with joystick or mouse and click.
- ✓ Compose with up to 8 completely independent voices.
- ✓ Room for over 18,000 notes. (This is not a misprint!)
- ✓ Super Simple Editing Supports:
  - Note insert — Block insert
  - Note delete — Block delete
  - Note change — Block copy
- ✓ Output music to:
  - TV Speaker — Monitor Speaker
  - STEREO PAK — ORCHESTRA 90
  - SYMPHONY 12 — COCO MIDI S/E
  - MIDI Synth — MIDI Drum Machine
- ✓ Output up to 4 voices without additional hardware.
- ✓ Output all 8 voices using either SYMPHONY 12 or one or more MIDI synthesizers and drum machines.
- ✓ Output any voice on any of the 8 MIDI channels.
- ✓ Transpose music to any key.
- ✓ Modify music to any tempo.
- ✓ Automatically inserts bar for each measure as you compose.
- ✓ Key signature lets you specify sharps and flats only once, LYRA will do the rest.
- ✓ Plays MUSICA 2 files using LYRA CONVERT (#LC164).
- ✓ Each voice may be visually highlighted or erased.
- ✓ Each measure is numbered for easy reading.
- ✓ Solo capability
- ✓ Block edits are highlighted.
- ✓ Tie notes together for musical continuity.
- ✓ Name of note pointed to is constantly displayed.
- ✓ Jump to any point in the score instantaneously.
- ✓ Memory remaining clearly displayed, however you will have plenty of memory even for the most demanding piece.
- ✓ Help menu makes manual virtually unnecessary.
- ✓ LYRA is 100% software, no need for extra hardware unless you want more power.
- ✓ Music easily saved to tape or disk.
- ✓ Requires 64K and mouse or joystick.

LYRA (Disk only) #LY122 . . . . **$54.95**

LYRA OPTIONS

These LYRA options are **not** required. They are provided for those wishing additional flexibility.

LYRA CONVERT

A program to convert MUSICA 2 files to LYRA files.

(T or D) #LC164 . . . . **$14.95**

LYRA STEREO ENHANCER

Gives the LYRA stereo output when used with the STEREO PAK or ORCHESTRA 90.

(T or D) #LS149 . . . . **$14.95**

LYRA MIDI CABLE

A cable to connect your computer to your MIDI synthesizer.

#MC158 . . . . **$14.95**

LYRA SYMPHONY 12 ENHANCER

Lets LYRA play all 8 voices through SYMPHONY 12.

(T or D) #LS177 . . . . **$19.95**

STEREO PAK

Plugs into the COCO ROM cartridge slot allowing easy connection to your stereo system.

#SP193 . . . . **$39.95**

SYMPHONY 12

A real hardware music synthesizer, lets LYRA play all 8 voices in stereo.

(T or D) #SY149 . . . . **$69.95**

COCO MID Seq/Editor

A professional quality MIDI interface for MIDI synthesizers.

(Disk only) #CM147 . . . . **$149.95**

MUSIC LIBRARY

A collection of over 800 songs. When used with CONVERT, it gives an incredible LYRA library. Each volume 100 songs.

(T or D) #MLXXX **$29.95**

COCO MAX is a trademark of Colorware.
ORCHESTRA 90 is a trademark of Radio Shack.

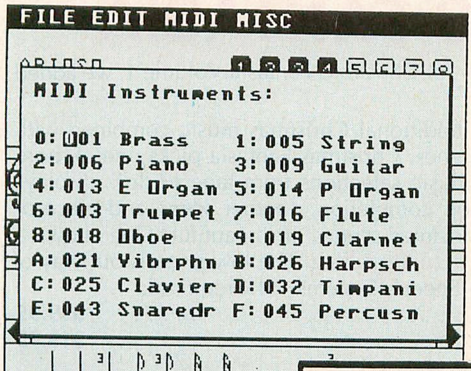
We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD Charge	$2.00

Illinois residents add 6¼% sales tax.

Speech Systems

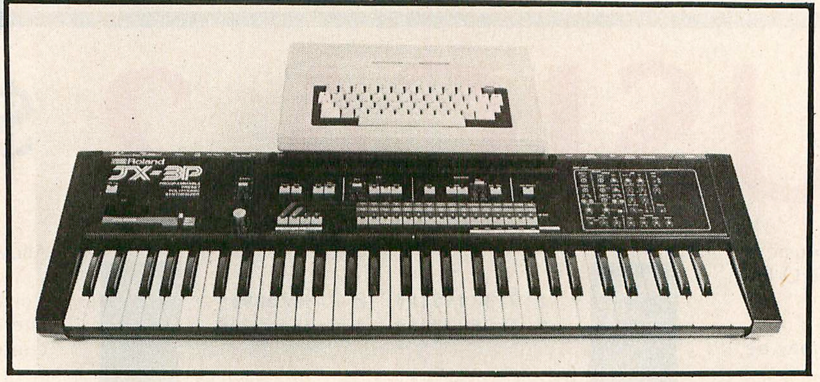
38W255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880



```
MIDI Instruments:

0:001 Brass    1:005 String
2:006 Piano    3:009 Guitar
4:013 E Organ  5:014 P Organ
6:003 Trumpet  7:016 Flute
8:018 Oboe     9:019 Clarnet
A:021 Vibrphn  B:026 Harpsch
C:025 Clavier  D:032 Timpani
E:043 Snaredr  F:045 Percusn
```

Introducing

COCO MIDI 2



Lyra COMPATIBLE!

MORE FEATURES!

MORE POWER!

Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, Yamaha, or Moog, it doesn't matter as long as it's MIDI equipped. Choose from our entry level MUSICA MIDI system that plays MUSICA files or our Professional COCO MIDI 2 system.

- Supports 16 Track recording and playback.
- Adjustable tempo.
- Over 45 Kbytes available (Over 15,500 MIDI events possible).
- Record to any track.
- Low Level track editing.
- LYRA editing. (one voice per track).
- Playback from any number of tracks.
- Quantizing to 1/16, 1/32, 1/64 intervals.
- Filter out MIDI data:
  - Key pressure
  - Program change
  - Pitch wheel
  - Control Change
  - Channel Pressure
  - System Message
- Graphic Piano Keyboard Display in both record and playback mode.
- Adjustable Key (Transposition).
- Save recording to disk for later playback or editing.
- Syncs to drum machine as MASTER or SLAVE.
- Sequencer features.
- 100% machine code.
- "Musician Friendly" Menu Driven.
- Metronome
- Many songs included.

Includes MIDI hardware interface, 2 MIDI cables, detailed manual, and software. Requires 64K CoCo, Y-Cable or Multi-Pak.

COCO MIDI 2 (disk only) #CM147	**$149.95**
DOUBLE Y-CABLE #DY181	**$28.95**
TRIPLE Y-CABLE #TY173	**$34.95**

DX LIBRARIAN™

Save and load voice parameters for the Yamaha DX series of synthesizers (DX-7, DX-100, DX-21 etc.). Save sounds individually or as a group letting you load the entire synthesizer in seconds. Comes with professionally developed voices for the DX-7 worth 10 times the price. Requires COCO MIDI hardware interface.

DX LIBRARIAN (Disk only) #DX143 . . . . $39.95

CASIO LIBRARIAN

Save and load voice parameters for any Casio synthesizer (CZ-101, CZ-1000, CZ-5000 etc.) You can save from the: presets, cartridge, memory or buffer. Requires COCO MIDI hardware interface.

CASIO LIBRARIAN (Disk only) #CL169 . . . . **$39.95**

MUSICA MIDI™

MUSICA MIDI takes any MUSICA 2 music file and plays it through your MIDI synthesizer. We offer you over 800 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using MUSICA 2. Inlcudes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer.

MUSICA MIDI Complete (Disk Only) #CM126 . . . . . . **$39.95**

MIDI KEYBOARD

If you own the Casio CZ-101 or similar MIDI synth, you know that the mini keys and the short 3 or 4 octave keyboard is limiting. MIDI KEYBOARD when used with our full size 5 octave keyboard gives you the flexibility you need. Comes with cable to connect the COCO to your MIDI synth.

MIDI KEYBOARD (Disk only) #MK167 . . . . **$29.95**

NEW!

CHRISTMAS FANTASIA

We got so many compliments last year for Christmas Fantasia Volume 1, we added a second all new version.

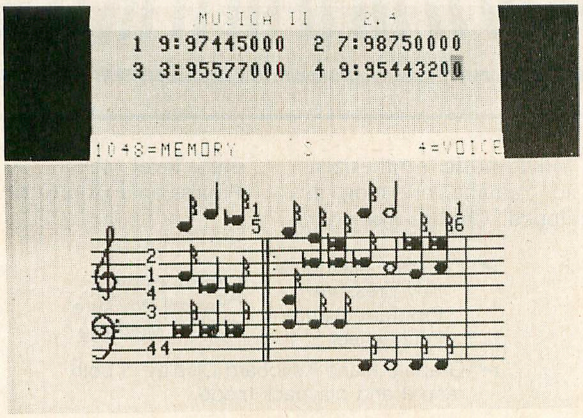
Christmas Fantasia is a collection of traditional Christmas music combined with beautiful high resolution Christmas scenes. Christmas Fantasia picks one of more than a dozen Christmas scenes and music selections from tape or disk, displays the picture and plays the music. Upon completion, another scene and piece of music is loaded and played. The Christmas scenes are beautiful. One shows a chapel nestled in a valley with **snow actually falling.** The low price is our way of saying "SEASONS GREETINGS" from Speech Systems. 64K required.

Volume 1 (Tape or Disk) #CF125 .... **$19.95**
Volume 2 (Tape or Disk) #CF126 .... **$19.95**

MUSICA 2

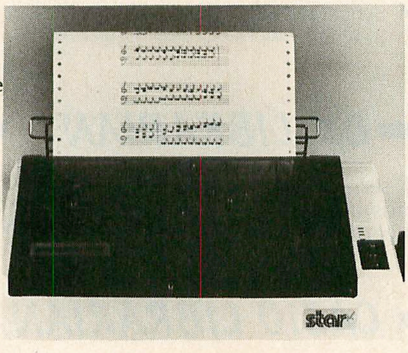
$29.95
Tape or Disk

- When in stereo mode, music is played through our STEREO PAK (*purchased separately*).
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Repeat bars allow repeating of music without re-inserting music a second or third time.
- 30 page manual describes all.
- Requires 64K.



```
MUSICA II    2.4
1 9:97445000  2 7:98750000
3 3:95577000  4 9:95443200

1048=MEMORY              4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).



- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.
- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

MUSIC LIBRARY™

The MUSIC LIBRARY series consists of 8 volumes: 100 through 800 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with STEREO PAK, the music is reproduced with unsurpassed realism.

A JUKEBOX program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music. MUSICA 2 users may customize each song. Each volume sold separately, specify tape or disk. #MLXXX **$29.95**
List of 800 songs #LS800 .... **$3.00**

MUSIC LIBRARY 100

Stage, Screen, & TV	Classical
Music of the 70's	Christmas (popular)
Music of the 60's	Christmas (traditional)
Music of the 50's	Patriotic
Old Time Favorites	Polka Party

MUSIC LIBRARY 200 (another 100 selections)
MUSIC LIBRARY 300 (another 100 selections)
MUSIC LIBRARY 400 (another 100 selections)
MUSIC LIBRARY 500 (another 100 selections)
MUSIC LIBRARY 600 (another 100 selections)
MUSIC LIBRARY 700 (another 100 selections)
MUSIC LIBRARY 800 (another 100 selections)

Entire Library
30 Hours of
Music!
40 disks
or
25 tapes

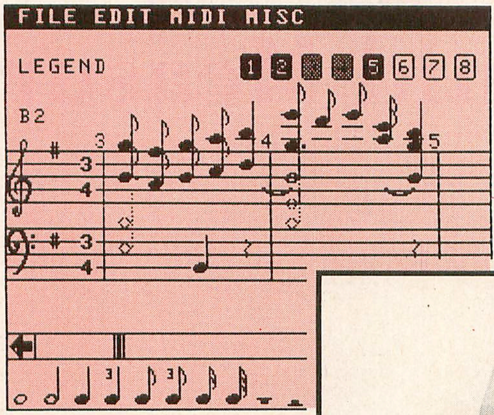
Lyra™ MEETS SYMPHONY 12™

12 SIMULTANEOUS VOICES

4 NOISE GENERATORS

STEREO & MONO

SOUND EFFECTS



musical applications of microprocessors

SPECIAL COMBINATION OFFER!

If you want to compose music, experiment, or just listen to music, LYRA is the tool you need. LYRA represents the new state-of-the-art super user friendly software. Pull down menus and icons make composing music as easy as pointing with a joystick or mouse and clicking. LYRA is capable of 8 individually controlled voices. You may take advantage of the 8 voice power of LYRA using external MIDI synthesizers or SYMPHONY 12. We believe that LYRA and SYMPHONY 12 was a match made in heaven. For a limited time, when you purchase both, we will include free the LYRA SYMPHONY 12 CONNECTION, a $19.95 value.

STEREO AND MONO. By connecting SYMPHONY 12 to your home stereo system, music is produced in stereo, 6 voices from each channel. However, you don't need to have a stereo system, all 12 voices also come out of your TV or monitor.

SOUND EFFECTS. SYMPHONY 12 is a sophisticated sound generator. 12 voices and 4 noise generators give you incredible sound effect capability. We have included gun shot, explosion, racing car and more.

SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

PIANO KEYBOARD. For those wishing to turn SYMPHONY 12 into a real polyphonic synthesizer we offer a full size 61 note piano keyboard.

Tape users using both SYMPHONY 12 and the PIANO KEYBOARD will require a Y-CABLE. Disk systems require a Triple Y-CABLE or MULTI-PAK.

SYMPHONY 12 (T or D) #SY149 . .	**$69.95**
LYRA SYMPHONY 12 ENHANCER #LS177	**$19.95**
PIANO KEYBOARD #PK185	**$169.95**
DOUBLE Y-CABLE #DY181	**$28.95**
TRIPLE Y-CABLE #TY173	**$34.95**

GUITAR CHORD BOOK

This program, written by a guitar instructor of 17 years, displays in high resolution graphics the exact fingering for over 100,000 chord combinations. You may even tune your guitar to the computer and play along. Whether you are a beginning guitar student or an advanced player, you will find this quick reference to guitar chords invaluable.
32K Disk only #GC153 . . . . **$29.95**

MUSIC THEORY

COURSE 1

This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2.
32K Disk only. #MT101 . . . . **$49.95**

COURSE 2

A more advanced course that deals with: Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and ear training of the intervals.
32K Disk only #MT102 . . . . **$49.95**

Prepare for Thanksgiving Cooking With Liquid Measure

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use but remain the property of the author.*

Now that November is upon us, our thoughts naturally turn toward that day of culinary feasting: Thanksgiving. While I trust that few of you carve the big bird by the green glow of your CoCo screen, I figured that this would be a perfect time to offer my own Thanksgiving gift to help instruct in a skill that will benefit any kitchen adventurer. So before we roll out the cranberries and stuffing, let's take a look at our latest "Wishing Well" presentation, *Liquid Measure*.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

The Wish

How many of you have actually tried to convince your spouse that investing in a Color Computer would help her in the kitchen? (Gee, Honey, you could put all your recipes on it.) I know a few people who have actually used this approach. Fortunately, the spouses usually agreed to the purchase for more practical reasons, such as their own interest in learning computer skills.

One of those practical reasons is educational in nature. Followers of the "Wishing Well" will by now be familiar with the fact that education is my primary reason for using the CoCo. I have always tried to find new ways to meet my students' needs using my CoCo while trying to accommodate your wishes as well. Since many of you have written about skills you would like to see serve as the basis for a "Wishing Well" program, *Liquid Measure* seemed to be the next progression. Rather than make it part of our Life Skills series, I have chosen to include some different elements to make the program more exciting and graphically interesting.

For anyone who ever had difficulty finding a way to express certain liquid measurement values in an understandable manner, *Liquid Measure* should be a big help for you or your youngsters. Using the text character graphics, we will display the material we want presented and then quiz it in a very attractive fashion.

The Program

Written to work on a 16K machine, *Liquid Measure* uses only the graphics capabilities of the CoCo found outside Extended Color BASIC. There are several reasons for this.

Since a good part of our material is covered in written form, we would naturally want to use our text characters for this purpose. If we were to use the high resolution graphics in Extended BASIC, we would need to create a whole graphics character set. While previous "Wishing Well" programs have done just that, our 16 by 32 text format is perfectly suited for our purposes. Also, since we are presenting information in small amounts, using the regular text characters makes our information appear much more visible on the screen.

The next major innovation I have used in this program is a completely inverted screen. Instead of using our green screen with black text, I have made all of the screens except the score card into an inverted black screen with inverse video characters. My reasons for this are two-fold. First, the graphics of the cups, pints, quarts, etc. look much more dramatic on a black field. Using regular characters would only detract from our intended effect.

Secondly, I was getting a little sick of the big black border around our green screen. Why not have our programs look as classy as the more expensive machines. Therefore, the time was right for an inverted screen. Presto!

One thing which I did not do with this program, however, is make it work on an MC-10. Adding the offset value to the screen pokes would slow down this program more than I would like. Those who need to translate the program to MC-10 should not have too much difficulty. I am starting to feel that very few of you are still using this mini-CoCo at all.

The subroutine that inverts the text is quite simple, actually. Our text is made equal to T$. We then evaluate each character of T$ and poke the inverted value to a given screen location. Therefore, be sure to save this program to tape or disk before you run it. A typo in one of the pokes could lock up your machine. Nothing is more frustrating than a locked-up machine when you have taken the time to type in a long listing from these pages. Be safe; save it first.

One special feature, which I included in the title card this time, was a rotating border like you would normally see at an old movie theater. Little flashing lights run circles around the words Liquid Measure until the user presses either ENTER to begin or 'Q' to skip directly ahead to the quiz section. I felt this kind of a change in outlook was a little overdue. I hope you like it.

Using the Program

If you chose to press ENTER at the start of the program, you are slowly walked through a display of the equivalent values, from one cup through one gallon. Since we are using the poke method of string evaluation mentioned earlier, the text slowly scrolls onto the screen character-by-character. To proceed to the next screen, the user need only press ENTER as the screen prompts appear.

At the end of the display, the program proceeds to a short quiz based on the *Homonym Quiz* from a previous "Wishing Well." The big difference between this version and the original is the use of the inverted black screen. I have also adapted any screen references to the homonyms so this quiz section is uniquely designed for the liquid measurement material.

The quiz only contains about 14 possible examples. However, if you want to add any extra quiz problems along the same format, you may enter additional examples (up to 50) in the data statements at the end of the listing. Just be sure that all data is in groups of three items: The first is the value, the second is the correct answer and the third is an incorrect response.

An example might be something like:

```
1000 DATA TWO QUARTS,1/2
GALLON,1/2 PINT
```

When asked to match the value of two quarts to the two possible choices, the answer would naturally be ½ gallon. All of my examples are singular expressions (one gallon, one pint, etc.) You may want to use plural examples like the sample I have just shown. Just be sure to delete my last data line with the end statements in it and replace it with:

```
5000 DATA END,END,END
```

This adds your problems to my own listing. I have put more than one problem in a data line in order to conserve space, although I would suggest that you use one line for each problem you create. You may even choose to delete all of my data. Just be sure to include the triple end statements in the final data line and not to exceed 50 problems. When the program is run, it jumbles the order of the problems and ensures that the appearance of the choices are also jumbled. The user needs only press the letter 'A' or 'B' for an answer in this multiple choice quiz. Pressing the '@' key ends the quiz early and skips directly to the score card. You may either rerun the program by pressing 'Y' for yes or end by pressing 'N' for no.

There is no CPL (Computer Paced Learning) in this program as found in some of my recent programs. Once you run this listing, you will understand why including this feature was not necessary.

Conclusion

While the skills presented in this program might seem elementary to some of you, I think you will find it very useful with youngsters who have not mastered these measurement skills. It also serves as a program guide for those of you who want to examine the program lines to get some ideas on using strings for graphics or text inversion.

Next month, I'll offer a special holiday gift to my readers. Until then, keep your ideas and suggestions coming. ☐

130	77	515	10
175	202	580	196
265	107	685	45
345	47	790	163
415	223	END	32
460	198		

The listing: LIQUID

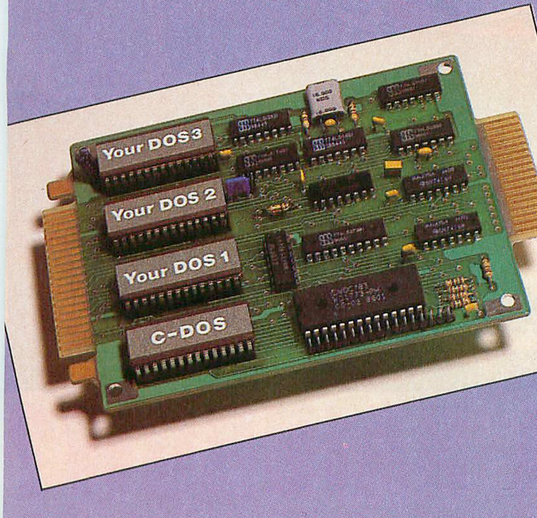
```
10 REM****************************
20 REM*    LIQUID MEASURE        *
30 REM*   BY FRED B.SCERBO       *
40 REM*  COPYRIGHT (C) 1986      *
50 REM*    60 HARDING AVENUE     *
60 REM* NORTH ADAMS, MA 01247    *
70 REM***************************
80 CLEAR1500:U$=CHR$(152):V$=CHR
$(232)
85 CLS0:FORI=1TO16:PRINTCHR$(152
)CHR$(232);:NEXT:PRINTCHR$(232);
:PRINT@63,CHR$(152)CHR$(152);
90 FORI=1089TO1280:READA
95 POKEI,A+128:NEXT
100 PRINT@287,CHR$(232);:FORI=1T
O16:PRINTCHR$(232)CHR$(152);:NEX
T
105 FORI=1TO17:READA:POKE1382+I,
A:NEXT:FORI=1TO19:READA:POKE1413
```

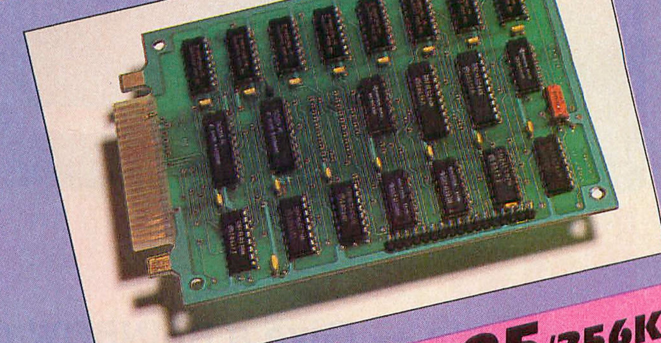
```
+I,A:NEXT
110 SH=1472:T$="     PRESS <ENTER
> OR <Q>UIZ.":GOSUB195
115 DATA,,,,47,32,32,,36,47,40,,
47,44,47,,47,32,47,,36,47,40,,47
,44,43,,,,104,104
120 DATA,,,,47,32,32,,32,47,32,,
47,33,47,,47,32,47,,32,47,32,,47
,32,47,,,,24,24
125 DATA,,,,44,44,44,,36,44,40,,
44,44,46,,44,44,44,,36,44,40,,44
,44,40,,,,104,104
130 DATA,63,50,49,63,,63,60,60,,
55,60,59,,63,60,60,,63,48,63,,63
,60,63,,63,60,60,,24,24
135 DATA,63,52,56,63,,63,60,60,,
63,60,63,,60,60,63,,63,48,63,,63
,61,50,,63,60,60,,104,104
140 DATA,60,48,48,60,,60,60,60,,
60,48,60,,60,60,60,,60,60,60,,60
,48,60,,60,60,60,,24,24
145 DATA2,25,32,6,18,5,4,32,2,46
,32,19,3,5,18,2,15
150 DATA3,15,16,25,18,9,7,8,20,3
2,40,3,41,32,32,49,57,56,54
155 FORI=1TO16:OW$=OW$+CHR$(232)
+CHR$(152):WO$=WO$+CHR$(152)+CHR
$(232):NEXT
160 PRINT@0,OW$;:PRINT@63,V$;:PR
INT@95,U$;:PRINT@127,V$;:PRINT@1
59,U$;:PRINT@191,V$;:PRINT@223,U
$;:PRINT@255,V$;:PRINT@287,U$;
165 PRINT@288,WO$;:PRINT@256,U$;
:PRINT@224,V$;:PRINT@192,U$;:PRI
NT@160,V$;:PRINT@128,U$;:PRINT@9
6,V$;:PRINT@64,U$;:PRINT@32,V$;
170 W$=INKEY$:IFW$=CHR$(13)THEN1
85ELSEIFW$="Q"THEN575
175 PRINT@0,WO$;:PRINT@63,U$;:PR
INT@95,V$;:PRINT@127,U$;:PRINT@1
59,V$;:PRINT@191,U$;:PRINT@223,V
$;:PRINT@255,U$;:PRINT@287,V$;
180 PRINT@288,OW$;:PRINT@256,V$;
:PRINT@224,U$;:PRINT@192,V$;:PRI
NT@160,U$;:PRINT@128,V$;:PRINT@9
6,U$;:PRINT@64,V$;:PRINT@32,U$;:
GOTO160
185 CLS0
190 GOTO230
195 SH=SH-1:T=LEN(T$):IFT<=32THE
N215
200 FORZ=32TO0STEP-1:IFMID$(T$,Z
,1)=" "THEN210
205 NEXTZ:GOTO215
210 S$=LEFT$(T$,Z)+STRING$(32-Z,
32):GOSUB220:T$=RIGHT$(T$,T-Z):S
H=SH+33:GOTO195
215 S$=T$+STRING$(32-T,32)::GOSU
B220:RETURN
220 S=LEN(S$):FORI=1TOS:Y=ASC(MI
D$(S$,I,1)):IFY>64THENY=Y-64
225 POKESH+I,Y:NEXTI:RETURN
230 CLS0
235 EQ$=CHR$(179)+CHR$(179)+CHR$
(179)+CHR$(179)
240 RR$=CHR$(204)
245 R$=CHR$(128)
250 L$=" "
255 CP$="C."
260 PT$="PT"
265 QT$="QT"
270 GH$="HALF":HG$="GAL."
275 D$=RR$+RR$+RR$+RR$+R$
280 E$=CHR$(205)+L$++L$+CHR$(206
)+R$+R$+R$
285 F$=CHR$(207)+L$++L$+CHR$(207
)+R$+R$+R$
290 G$=CHR$(205)+L$+L$+L$+L$+CHR
$(206)+R$
295 H$=CHR$(207)+L$+L$+L$+L$+CHR
$(207)+R$
300 J$=CHR$(204)+CHR$(204)+CHR$(
204)+CHR$(204)+CHR$(204)+CHR$(20
4)+R$
305 GA$=CHR$(205)+L$+L$+L$+L$+L$
+L$+CHR$(206)+R$
310 GB$=CHR$(207)+L$+L$+L$+L$+L$
+L$+CHR$(207)+R$
315 GC$=RR$+RR$+RR$+RR$+RR$+RR$+
RR$+RR$+R$
320 GOTO395
325 REM CUP
330 PRINT@L+32,CHR$(207)"C."CHR$
(207)CHR$(205)R$;:PRINT@L+64,D$;
:RETURN
335 REM PINT
340 PRINT@L,E$;:PRINT@L+32,F$;:P
RINT@L+64,D$;:PRINT@L+33,PT$;:RE
TURN
345 REM QUART
350 PRINT@L+32,E$;:PRINT@L+64,F$
;:PRINT@L+96,F$;:PRINT@L+128,D$;
:PRINT@L+97,QT$;:RETURN
355 REM HALF GAL
360 PRINT@L,G$;:PRINT@L+32,H$;:P
RINT@L+64,H$;:PRINT@L+96,H$;:PRI
NT@L+128,J$;:PRINT@L+65,GH$;:PRI
NT@L+97,HG$;:RETURN
365 REM GALLON
370 PRINT@L,GA$;:PRINT@L+32,GB$;
:PRINT@L+64,GB$;:PRINT@L+96,GB$;
:PRINT@L+128,GBJ$;:PRINT@L+160,G
C$;:PRINT@L+130,HG$;:RETURN
375 REM HOLD SCREEN
380 T$="   PRESS <ENTER> TO CONT
INUE.":SH=1504:GOSUB195
```

FROM C.R.C COMPUTERS
DISTO SUPER PRODUCTS

DISTO SUPER CONTROLLER $99.95

- Gold contacts on all connectors
- Shielded metal box
- Four 28 pin sockets for software expandibility
- Uses 2764 or 27128 EPROMs only
- EPROMs are software selectable
- Internal Mini-Expansion-Bus interface for DISTO SUPER add-ons or user projects
- C-DOS included (RS-DOS compatible), single or double sided, 6 to 30 ns step rate
- Works on all COCOs or COCO IIs





DISTO SUPER RAMDISK $129.95/256K $169.95/512K

- Inexpensive 2nd drive Emulator
- Works with all COCOs (Multi-Pak required)
- Easy installation. Just plug in and go
- Low software overhead
- Much faster than a regular drive
- Plain language instructions
- Complete OS-9 Drivers available*
- Compatible with COCOMAX if used with C-DOS+
- Internal Mini-Expansion-Bus for DISTO ADD-ONS
- Gold contacts on all connectors
- Shielded metal box

DISTO SUPER ADD-ONS
Four add-ons are currently available

- **REAL TIME CLOCK/PRINTER INTERFACE** An internal clock that will keep the proper time, date and year. A small battery keeps the time when the computer is off. Retreive and set the time by using simple Basic Pokes. The Real Time Clock/Parallel Printer Adapter is a single unit. Software drivers included. $39.95
- **MINI EPROM PROGRAMMER** Yes, a low cost programmer that attaches to the DISTO SUPER CONTROLLER or SUPER RAMDISK. Program those often used utilities into EPROMs and plug them directly into your controller. Will program 2764's or 27128's. A perfect mate for the DISTO SUPER CONTROLLER. $54.95
- **DISPLAY 80 SUPER CARD** A real knock-out. DISPLAY 80 is a three in one card. It's major function is to add an 80 column by 24 line display to your computer. This feature packed package also includes a REAL TIME CLOCK and PARALLEL PRINTER INTERFACE. An all-in-one package that fits neatly inside the Controller or Super Ramdisk. OS-9 software available*. $139.95
- **HARD DISK INTERFACE (Coming soon)** Fits inside Super Controller or Super Ramdisk. S.A.S.E. interface compatible. OS-9 Drivers available*. Supports WD-1002-SHD or ZEBEC 1410 controller.

CRC COMPUTERS inc.

10802 Lajeunesse,
Montreal, Quebec
Canada, H3L 2E8
1-514-383-5293

The DISTO SUPER CONTROLLER, add-ons and documentation are received and designed by Tony Di Stefano. The DISTO SUPER CONTROLLER and add-ons are manufactured and distributed by: CRC COMPUTERS INC. DISTO and C.R.C Computers are registered trade marks. The DISTO Super Controller and add-ons are copyrighted by DISTO.

*All OS-9 drivers sold separately

HOW DO YOU TOTE A RAINBOW?

It's simple — Give a RAINBOW gift certificate . . .

Let a gift subscription to THE RAINBOW carry the premier Color Computer magazine right to your friends' doorsteps. THE RAINBOW is *the* information source for the Tandy Color Computer.

Each month, your friends will enjoy the intelligent programs, reviews and articles written exclusively for their CoCo.

First, your gift will be announced in a handsome card. Then, all year round, they'll remember you and your thoughtfulness when they get each edition of THE RAINBOW — over 250 pages loaded with as many as 24 programs, 15 regular columns and lots of helpful hints and tips.

Generosity benefits the giver, too. There'll be no more searching for lost copies of THE RAINBOW. Your collection will be safe at home.

Give a RAINBOW gift certificate and let your friends in on the fun. THE RAINBOW is the perfect companion *for the Color* Computer!

Please begin a one-year (12 issues) gift subscription to THE RAINBOW for:

Name ____________________
Address ____________________
City ____________ State ________ ZIP ________

From:

Name ____________________
Address ____________________
City ____________ State ________ ZIP ________

☐ My payment is enclosed
Bill to: ☐ VISA ☐ MasterCard ☐ American Express
Acct. # ____________________ Exp. date ________
Signature ____________________

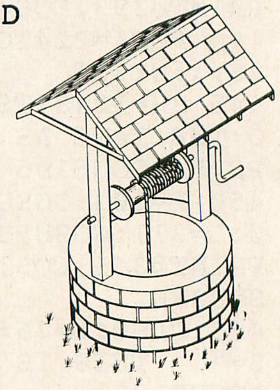
Mail to:
Rainbow Gift Certificate, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST.
All other inquiries call (502) 228-4492.

Subscriptions to THE RAINBOW are $31 in the United States; U.S. $38 in Canada. The surface rate to other countries is U.S. $68; the air rate, U.S. $103. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.** All subscriptions begin with the current issue. Please allow 6 to 8 weeks for delivery. In order to hold down non-editorial costs, we do not bill.

```
385 IFINKEY$<>CHR$(13)THEN385ELS
ERETURN
390 S=LEN(S$):FORI=1TOS:SS=ASC(M
ID$(S$,I,1)):SS=SS-64:IFSS=-32TH
ENSS=32ELSEIFSS=-18THENSS=46
395 L=172:GOSUB330:SH=1088:T$="
      THIS IS ONE CUP.":GOSUB195
400 T$="  ONE CUP IS THE SAME AS
 EIGHT          FLUID OUNCES.":S
H=1344:GOSUB195
405 GOSUB380
410 CLS0:L=141:GOSUB340:SH=1088:
T$="       THIS IS ONE PINT.":GO
SUB195
415 SH=1248:T$=" ONE PINT IS THE
 SAME THING AS TWO CUPS AND IS S
IXTEEN OUNCES.":GOSUB195
420 L=323:GOSUB340:L=335:GOSUB33
0:L=343:GOSUB330:PRINT@329,EQ$;:
PRINT@361,EQ$;:GOSUB380
425 CLS0:L=77:GOSUB350:SH=1056:T
$="      THIS IS ONE QUART.":GOS
UB195
430 SH=1248:T$=" ONE QUART IS TH
E SAME AS TWO PINTS AND IS THIRT
Y TWO OUNCES.":GOSUB195
435 L=291:GOSUB350:L=367:GOSUB34
0:L=375:GOSUB340:PRINT@361,EQ$;:
PRINT@393,EQ$;:GOSUB380
440 FORI=224TO287:PRINT@I,CHR$(1
28);:NEXTI
445 SH=1248:T$="ONE QUART IS ALS
O THE SAME AS            FOUR CU
PS.":GOSUB195
450 L=303:GOSUB330:L=367:GOSUB33
0:L=311:GOSUB330:L=375:GOSUB330:
PRINT@361,EQ$;:PRINT@393,EQ$;:GO
SUB380
455 CLS0:L=76:GOSUB360:SH=1024:T
$="   THIS IS ONE HALF GALLON.":
GOSUB195
460 SH=1248:T$=" ONE HALF GALLON
 IS THE SAME AS TWO QUARTS OR SI
XTY FOUR OUNCES.":GOSUB195
465 L=322:GOSUB360:L=335:GOSUB35
0:L=343:GOSUB350:PRINT@361,EQ$;:
PRINT@393,EQ$;:GOSUB380
470 FORI=224TO287:PRINT@I,R$;:NE
XTI
475 SH=1248:T$=" A HALF GALLON I
S ALSO THE SAME          AS FOUR
PINTS.":GOSUB195
480 L=303:GOSUB340:L=399:GOSUB34
0:L=311:GOSUB340:L=407:GOSUB340:
PRINT@361,EQ$;:PRINT@393,EQ$;:GO
SUB385
485 CLS0:L=76:GOSUB360:SH=1024:T
$="    ONE HALF GALLON IS ALSO":
GOSUB195
490 SH=1248:T$="      EQUAL TO E
IGHT CUPS.":GOSUB195
495 FORL=290TO316STEP7:GOSUB330:
NEXTL:FORL=354TO380STEP7:GOSUB33
0:NEXTL:GOSUB380
500 CLS0:L=44:GOSUB370:SH=1024:T
$="    THIS IS ONE WHOLE GALLON.
":GOSUB195
505 SH=1248:T$="   ONE GALLON IS
 EQUAL TO ONE HUNDRED AND TWENTY
 EIGHT OUNCES.":GOSUB195:GOSUB38
0
510 FORI=224TO287:PRINT@I,R$;:NE
XTI:FORI=0TO31:PRINT@I,R$;:NEXTI
515 SH=1024:T$=" ONE WHOLE GALLO
N IS THE SAME AS":GOSUB195:SH=12
48:T$="        TWO HALF GALLONS.
":GOSUB195
520 FORL=328TO338STEP10:GOSUB360
:NEXTL:GOSUB385
525 FORI=224TO479:PRINT@I,R$;:NE
XTI
530 SH=1248:T$="          FOUR Q
UARTS.":GOSUB195
535 FORL=325TO345STEP6:GOSUB350:
NEXTL:GOSUB385
540 FORI=224TO479:PRINT@I,R$;:NE
XTI
545 SH=1248:T$="          EIGHT
PINTS.":GOSUB195
550 FORL=293TO313STEP6:GOSUB340:
NEXTL:FORL=389TO409STEP6:GOSUB34
0:NEXTL:GOSUB380
555 FORI=224TO479:PRINT@I,R$;:NE
XTI
560 SH=1248:T$="         SIXTEEN
 CUPS.":GOSUB195
565 L=186:GOSUB330:FORL=226TO251
STEP6:GOSUB330:NEXTL:FORL=290TO3
15STEP6:GOSUB330:NEXTL:FORL=354T
O380STEP6:GOSUB330:NEXTL:GOSUB38
5
570 PRINT@480,"";
575 CLS0
580 DIM AO(51),A$(51),B$(51),C$(
51),NP(51)
585 SW=30:KZ=RND(-TIMER):FORJ=1T
O51
590 READ A$(J),B$(J),C$(J):IF A$
(J)="END" THEN600
595 NEXTJ
600 J=J-1
605 FORI=1 TO J
610 AO(I)=RND(J)
615 IF NP(AO(I))=1 THEN610
620 NP(AO(I))=1:NEXTI
625 FOR P=1TOJ
```

```
630 FORI=1024TO1535:POKEI,32:NEX
T
635 SH=1056:T$="  REVIEW EXAMPLE
 NUMBER"+STR$(P)+".":GOSUB195
640 SH=1120:T$="  "+A$(AO(P))+"
IS EQUAL TO WHICH":GOSUB195
645 SH=1152:T$="  OF THE FOLLOWI
NG CHOICES ?":GOSUB195
650 JK$=A$(AO(P))
655 D=RND(20):IFD=>11THEN665
660 F$=B$(AO(P)):H$=C$(AO(P)):J$
="A":M$="B":GOTO670
665 F$=C$(AO(P)):H$=B$(AO(P)):J$
="B":M$="A":GOTO670
670 SH=1221:T$="A) "+F$:GOSUB195
675 SH=1285:T$="B) "+H$:GOSUB195
680 G$=INKEY$:IF G$=""THEN680
685 IF G$=J$THEN705
690 IF G$=M$THEN705
695 IF G$="@"THEN755
700 GOTO680
705 IF G$=J$THEN720
710 GOTO730
715 IF C(F(G))<>AO(P) THEN730
720 SH=1349:T$="YOU ARE CORRECT!
":GOSUB195
725 CR=CR+1:GOTO740
730 SH=1344:T$="  SORRY! THE COR
RECT ANSWER IS":GOSUB195:SH=1378
:T$=B$(AO(P))+".":GOSUB195
735 IR=IR+1
740 SH=1442:T$="(PRESS <ENTER> T
O CONTINUE .)":GOSUB195
745 IFINKEY$<>CHR$(13)THEN745
750 NEXTP
755 CLS:PRINT:PRINT:PRINT
760 PRINT"     NUMBER CORRECT = "
CR
765 PRINT
770 PRINT"     NUMBER WRONG   = "
IR
775 J=CR+IR:IFJ=0THENJ=1
780 PRINT:PRINT"     STUDENT SCOR
E  = ";INT(CR*100/J);"%"
785 PRINT:PRINT"     ANOTHER TRY
(Y/N)";
790 W$=INKEY$:IF W$=""THEN790
795 IF W$="Y" THEN RUN
800 IF W$="N" THEN CLS:END
805 GOTO790
810 REM ENTER DATA AT LINE 1000
815 DATA ONE CUP,EIGHT OUNCES,FO
UR OUNCES,ONE PINT,TWO CUPS,FOUR
 CUPS,ONE PINT,SIXTEEN OUNCES,EI
GHT OUNCES
820 DATA ONE QUART,TWO PINTS,TWO
 CUPS,ONE QUART,FOUR CUPS,SIXTEE
N OUNCES,ONE QUART,32 OUNCES,FOU
R PINTS
825 DATA 1/2 GALLON,TWO QUARTS,T
WO PINTS,1/2 GALLON,FOUR PINTS,E
IGHT PINTS,1/2 GALLON,EIGHT CUPS
,32 OUNCES,1/2 GALLON,64 OUNCES,
128 OUNCES
830 DATA ONE GALLON,FOUR QUARTS,
FOUR PINTS,ONE GALLON,EIGHT PINT
S,FOUR PINTS,ONE GALLON,SIXTEEN
CUPS,SIXTEEN OUNCES
835 DATA ONE GALLON,128 OUNCES,6
4 OUNCES
840 DATA END,END,END
```



ASSEMBLY LANGUAGE PROGRAMMING for the TRS-80 COLOR COMPUTER

At last - The book exclusively for you and your CoCo !! You've learned BASIC and are now ready to learn assembly language programming. This hands-on guide begins with the basics and progresses to the expert level; revealing programming conventions and techniques and all the internal capabilities of the TDP-100, CoCo 1 and 2. At every step of the way are illustrations, sample programs, and plain English explanations. All sample programs are shown as assembled with Radio Shack's EDTASM+ cartridge. Plus, a complete chapter explains how to use all EDTASM+ capabilities. This book describes how to write subroutines, interrupt handlers, programs that control the graphics display modes, cassette, disk, keyboard, sound, joysticks, serial I/O, interrupts, and use of ROM resident subroutines. Also covered are the MC6809E microprocessor, the video display generator (VDG), peripheral interface adapters (PIA), SAM, memory, and how they all work together. Suitable as a high school or college textbook.

CHAPTERS: The Binary Number System - Memory and Data Representation - Introduction MC6809E Microprocessor - Addressing Modes of the MC6809E - MC6809E Instruction Set - Assembly Language Programming with EDTASM+ - Assembly Language Programming - Assembly Language and Extended Color BASIC - Internal Control and Graphics - Technical Details.

289 pages
soft cover
$16.00 U.S. plus $1.50 shipping. Check or money order. RI residents please add 6% sales tax. Inquire about volume discounts.

TRS-80 & EDTASM+ are trademarks of Tandy Corp

Published and sold by

TEPCO
30 Water Street
Portsmouth, RI 02871

PRICE WILL INCREASE TO $18.00 S/H JAN. 1987

HOT HARDWARE

UNIVERSAL VIDEO DRIVER

IT'S THE BEST!!! **Great Price! Only $29.95**

Carefully engineered to work with ALL Color Computer models including the newest COCO II. Enables your COCO to operate with a video monitor instead of a television.

- Works with monochrome monitors!
- Works with color monitors!
- Audio Connection included!
- Easy installation—no soldering!

PCX-II COMPUTER

Total IBM compatibility at sensational prices!!!

Complete computer systems starting as low as **$649.00.**
Check our performance and prices.

TANDY 1000 UPGRADES

640K upgrade board with real time clock	$189.95
Serial Interface Board	49.95
Parallel Interface Board	29.95
Hayes compatible 300/1200 Baud deluxe modem	189.95

QUALITY VIDEO MONITORS

Sakata SC-100 Color monitor with speaker and earphone jack	$179.95
Magnavox BM-7622 Amber Screen - high quality, low price	109.95

Order a quality monitor from us and get a Universal Video Driver for only $24.95 — Save $5.00.

PRINTERS AND ACCESSORIES

Citizen 120-D Printer, Deluxe features	Only $219.95
Star NX-10 Printer, New model for '86	279.95
Star LV-1210, replace popular SG-10 model	209.95

GRAFX SCREEN - versatile screen dump software. Print horizontal or vertical, image magnification, positive or negative and more - 5¼" disc.
ONLY $14.95

GRAFX SCREEN — FREE with your printer order.

SERIAL TO PARALLEL INTERFACE

300 to 9600 baud. Complete with all cables and connectors. **Only $49.95**

DISC DRIVES

Teac 55B DSDD Drive	$119.95
J&M JFD-CP Controller with DOS	139.95
Dual cabinet, power supply holds 2 horizontal 1/2 height drives	79.95
Drive one upgrade for new Tandy dual horizontal cabinet	119.95
Disc drive cable	24.95
Radio Shack DOS Rom 1.1 w/manual	29.95

DISCS • CASSETTES • ROMS • CHIPS

5¼" discs, double density, reinforced hub w/sleeve, guaranteed.
$12.95 for 10 discs in an attractive storage box.

C-10 Cassettes w/labels	10 for $5.50
Cassette storage box	10 for $2.00
Basic 1.2 ROM	$39.95
Extended 1.1 ROM w/Manual	$49.95

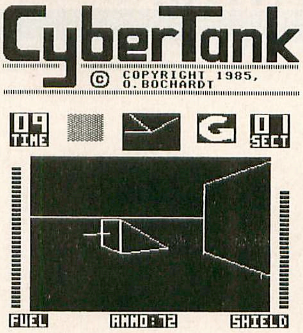
DISC STORAGE CASE - Attractive, heavy duty acrylic case with lock. Holds and protects 50 5¼" discs. **SUPER BARGAIN ONLY $9.95**

Purchase this attractive storage case including 10 discs for $21.95.

64K Memory Expansion Kit.

All parts and complete instructions (for 'E' and 'F' boards and COCO II)
NOW ONLY $19.95

SUPER SOFTWARE



ORDER NOW! 64K Disk only.
$27.95

NEW! OUTSTANDING GRAPHICS!

Tired of flying wimpy airplanes???

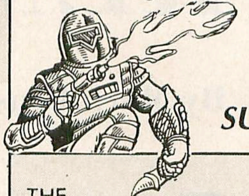
Want to try something macho for a change??

CYBERTANK is a real-time tank simulation that will get your adrenalin flowing!

Your survival depends upon lightening-fast tactical decisions. Penetrate deep into enemy territory with powerful intelligence gathering devices and sophisticated armaments. Cannons, heat seeking missiles, flame throwers, pill boxes, battle tanks... ***THIS ONE HAS IT ALL!!***

Other Super Arcade Games:
Tut's Tomb
Time Fighter

SHOCK TROOPER



Intelligence has intercepted a coded message revealing a plan to conquer Earth. Four of your Shocktroopers must infiltrate the heavily defended underground enemy base and steal all of the secret TRG-5 attack saucer sub-assemblies.

SUPER ACTION ARCADE GAME!!

THE VORTEX FACTOR

The Sixth & Most Challenging of our Adventures

What is it? What secrets does it hold? The seeker of treasures through time and space must find out! From the Coliseum of ancient Rome to the futuristic world of tomorrow. ***UNFORGETTABLE ODYSSEY.***

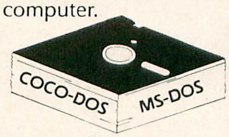
Other Exciting Adventures

Calixto Island
Shenanigans
Sea Search • Trekboer
Black Sanctum

All games -
Cassettes $24.95
Discs $27.95
32K required.

COCO UTIL II - NEW VERSION

Transfer Coco disc files to your IBM compatible computer. You may also transfer MS-DOS files to a Color Computer disc. Save hours of retyping. Coco Util has been so popular we decided to make it even more powerful and versatile... extended directories, faster, improved menu selection system and more!



$39.95

Coco Util users upgrade to the new version for only $12.95 including shipping and handling.

FOR THE SERIOUS COCO USER

Accounting System - very popular ledger system for small businesses.	$99.95 disk
Order Entry - an excellent companion to the accounting system	$99.95 disk
Easy File - get organized with this user friendly data management system	$59.95 disk

Super Screen - Best screen enhancement program available.
Cassette $29.95 Disk $32.95

FREE—Send for our free flier.

Mark Data Products

24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691 • (714) 768-1551

SHIPPING: All orders under $100 please add $2 regular, $5 air. All orders over $100 please add 3% regular, 8% air. California residents please add 6% sales tax. Orders outside the continental U.S., check with us for shipping amount; please remit U.S. funds. Software authors—contact us for exciting program marketing details. We accept MasterCard and VISA, Distributed in Canada by Kelly Software.

TELECOMMUNICATIONS

32K Disk

A modification to use Remote2 with an RS-232 Pak

The Evolving REMOTE

By Mark Crosby

I have changed Scott Taylor's *Remote2* improved remote terminal driver [November 1985, Page 106] to operate with a modified RS-232 Program Pak. By slightly modifying the RS-232 Pak, it can be adapted to work with a Y cable and disk drive.

Removing the ROM chip (U3) eliminates the memory conflict between Disk BASIC and the Pak ROM. Cutting the wire jumper connecting pads E1 and E2 separates the IRQ of the ACIA from positions 4 and 8 of the cartridge connector.

If the jumper is not cut, any data input causes the IRQ to become active, which triggers the non-maskable interrupt and the cartridge interrupt detection input of the computer. When the CART Pin is active, the computer resets. If you have the disk controller connected, the computer shows the opening credits.

After all the hardware modifications are done, it is just the exchange of routines to be able to communicate through the Pak.

The input routine could look like that in Figure 1.

The output routine could look like that in Figure 2.

```
RCV     PSHS    B       save the contents of B
        LDB     $FF69   get status of ACIA
        ANDB    #$08    check for full receive register
        BEQ     NOIN    no input, jump out
        ANDB    #$07    check for receive errors
        BNE     ERR     jump to error section
        LDA     $FF68   load A with data input
        PULS    B       retrieve B
        RTS             go back to calling section
```

Figure 1

Mark Crosby, from Hymera, Ind., is a senior at Indiana State University majoring in applied computer technology. He has owned a CoCo for two years and is currently compiling information to construct an interactive space flight Simulation.

```
OUT     PSHS    B        save the contents of B
OUT1    LDB     $FF69    get status of ACIA
        ANDB    #$10     check for full transmit register
        BEQ     OUT1     if full, go back and check again
        STA     $FF68    transmit data
        PULS    B        retrieve B
        RTS              go back to calling section
```

Figure 2

These lines replace all programming required for the bit-banger method, and it is a lot faster too.

In addition to making the hardware change and using *Remot232* program or some other routine, you need to tell the 6551 ACIA what communication parameters you want to use. You can do this by poking certain values into the control register (location $FF6B) and the command register (location $FF6A). To configure the RS-232 Pak for 300 Baud, one stop bit, 7-bit word length, even parity and no echo, the following values need to be poked to the registers before loading *Remot232*:

`POKE$HFF6B,54` (press ENTER)
`POKE$HFF6A,107` (press ENTER)

For different settings, consult pages 15 and 16 of the manual that came with your RS-232 Pak.

One you have made all modifications and poked the control and command registers, `LOADM` and execute *Remot232*. Now you may control your CoCo via an external terminal, say a Model 100 or a full 80-column terminal.

I tested the modification by changing the RS-232 routines in the *Remote2* program. It worked well at 300 Baud and allowed the use of the printer. ☐

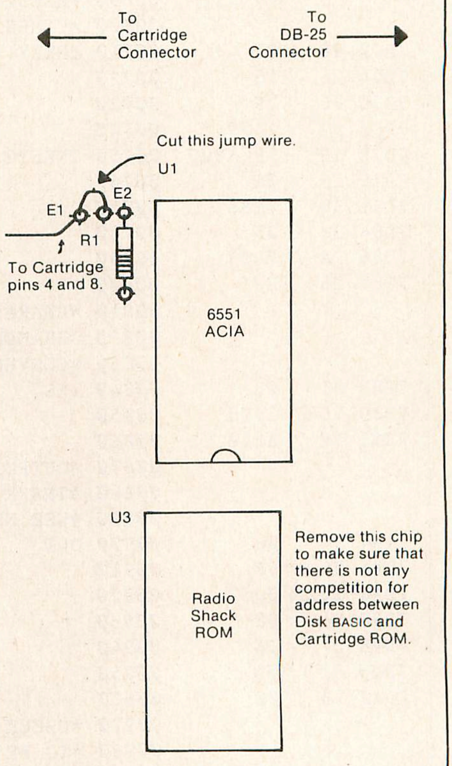

To Cartridge Connector
To DB-25 Connector
Cut this jump wire.
U1
E1
E2
R1
To Cartridge pins 4 and 8.
6551 ACIA
U3
Radio Shack ROM
Remove this chip to make sure that there is not any competition for address between Disk BASIC and Cartridge ROM.

Figure 3

Editor's Note: *Remot232* will be included on RAINBOW ON TAPE as well as RAINBOW ON DISK. To transfer the file from tape to disk, type `CLOADM"REMOT232"` and press ENTER. When the file has loaded from tape, enter `SAVEM "REMOT232",&H7D00,&H7EE4,&H7D32`

The listing: REMOT232

```
                     00100 ****************************
                     00110 *         REMOTE2          *
                     00120 * AN IMPROVED REMOTE       *
                     00130 *        TERMINAL          *
                     00140 * DRIVER FOR THE COCO BY*
                     00150 * SCOTT TAYLOR RAINBOW     *
                     00160 *         11/85            *
                     00170 * FROM THE ORIGINAL        *
                     00180 * REMOTE PROGRAM BY        *
                     00190 * DAN DOWNARD RAINDOW      *
                     00200 *         11/83            *
                     00210 * SET TO OPERATE ON A      *
                     00220 * MODIFIED RS232 PROGRAM*
                     00230 * PAK BY MARK CROSBY       *
                     00240 *         3/86             *
                     00250 ****************************
7D00                 00260         ORG     $7D00
                     00270 *EQUATES FOR ROM & RAM
      016A           00280 IHOOK   EQU     $016A
      0167           00290 OHOOK   EQU     $0167
      A000           00300 POLCAT  EQU     $A000
      006F           00310 DEV     EQU     $6F
      0070           00320 FLAG    EQU     $70
7D00      01         00330 BREAK   FCB     $01
7D01      01         00340 CORNER  FCB     $01
7D02      01         00350 LFFLG   FCB     $01
7D03      00         00360 PRTFLG  FCB     $00
7D04      00         00370 ICASE   FCB     $00
7D05      00         00380 OCASE   FCB     $00
7D06      9F         00390 CURSOR  FCB     $9F
7D07      0400       00400 NOSCRL  FDB     $400
7D09      00         00410 COUNTR  FCB     $00
7D0A                 00420 TABLE   RMB     $28
                     00430 *INITIALIZE RAM HOOKS
7D32 BE   0168       00440 START   LDX     1+OHOOK
7D35 AF   8D 012D    00450         STX     1+NTSCRN,PCR
7D39 BE   016B       00460         LDX     1+IHOOK
7D3C AF   8D 0193    00470         STX     1+IRET2,PCR
7D40 86   7E         00480         LDA     #$7E
7D42 B7   0167       00490         STA     OHOOK
7D45 B7   016A       00500         STA     IHOOK
7D48 30   8D 0048    00510         LEAX    OUT,PCR
7D4C BF   0168       00520         STX     1+OHOOK
7D4F 30   8D 0115    00530         LEAX    IN,PCR
7D53 BF   016B       00540         STX     1+IHOOK
                     00550 * MOVE TABLE OF ROM ADDRESS
                     00560 *SET INKEY$ TO RAM BASED ROUTINE
7D56 8E   AA29       00570 MOVTBL  LDX     #$AA29
7D59 31   8C AE      00580         LEAY    TABLE;PCR
7D5C 10BF 0128       00590         STY     $128
7D60 EC   81         00600 GETADD  LDD     ,X++
7D62 ED   A1         00610         STD     ,Y++
7D64 8C   AA51       00620         CMPX    #$AA51
7D67 26   F7         00630         BNE     GETADD
7D69 30   8D 0005    00640         LEAX    INKEY,PCR
7D6D 31   3C         00650         LEAY    -4,Y
7D6F AF   A4         00660         STX     ,Y
7D71 39              00670 RET     RTS
```

```
                      00680 *CHECK KEYBOARD AND
                      00690 *RS232 FOR INKEY$ 255
                      00700 *TIMES IF NOTHING IN $87
7D72 96   87          00710 INKEY   LDA     <$87
7D74 26   15          00720         BNE     YES
7D76 86   FF          00730         LDA     #$FF
7D78 B7   7D09        00740         STA     COUNTR
7D7B AD   9F A000     00750 INKEY2  JSR     [POLCAT]
7D7F 26   0A          00760         BNE     YES
7D81 BD   7E88        00770         JSR     REMIN
7D84 26   05          00780         BNE     YES
7D86 7A   7D09        00790         DEC     COUNTR
7D89 26   F0          00800         BNE     INKEY2
                      00810 *CHARACTER IN A REGISTER
                      00820 *BRANCH IF BREAK (A=$03)
                      00830 *CONVERT TO STRING
7D8B 81   03          00840 YES     CMPA    #$03
7D8D 1027 3078        00850         LBEQ    $AE09
7D91 7E   A56B        00860         JMP     $A56B
                      00870 *OUTPUT CHARACTER IF DEV=0
                      00880 *INSERT LINE FEEDS IF NEEDED
                      00890 *USE NEW PRINT ROUTINE
7D94 34   06          00900 OUT     PSHS    A,B
7D96 0D   6F          00910         TST     <DEV
7D98 1026 00C7        00920         LBNE    NTSCN1
7D9C 81   08          00930         CMPA    #$08
7D9E 27   1A          00940         BEQ     RMOUT2
7DA0 81   0D          00950         CMPA    #$0D
7DA2 26   0E          00960         BNE     REMOUT
                      00970 *CHECK IF LINE FEEDS ARE
                      00980 *TO BE SENT TO REMO-TERM
7DA4 F6   7D02        00990         LDB     LFFLG
7DA7 27   11          01000         BEQ     RMOUT2
7DA9 86   0A          01010         LDA     #$0A
7DAB BD   7ED5        01020         JSR     RSOUT
7DAE 86   0D          01030         LDA     #$0D
7DB0 20   08          01040         BRA     RMOUT2
                      01050 *ECHO CHARACTER IN PRTFLG
                      01060 *IF IT IS NOT = TO 0
7DB2 F6   7D03        01070 REMOUT  LDB     PRTFLG
7DB5 27   03          01080         BEQ     RMOUT2
7DB7 B6   7D03        01090         LDA     PRTFLG
                      01100 *CHECK OUTPUT FOR UPPER-C
                      01110 *OR LOWER-C AND SEND IT
7DBA F6   7D05        01120 RMOUT2  LDB     OCASE
7DBD BD   7EAC        01130         JSR     CKCASE
7DC0 BD   7ED5        01140         JSR     RSOUT
7DC3 35   06          01150 ORET1   PULS    A,B
7DC5 34   34          01160 ORET2   PSHS    B,X,Y
                      01170 *CHECK FOR BREAK KEY
7DC7 F6   0154        01180         LDB     $154
7DCA C1   BF          01190         CMPB    #$BF
7DCC 27   2C          01200         BEQ     PULL
7DCE 9E   88          01210         LDX     $88
7DD0 81   08          01220         CMPA    #$08
7DD2 27   38          01230         BEQ     BKSPC
7DD4 81   0D          01240         CMPA    #$0D
7DD6 27   67          01250         BEQ     ENTER
7DD8 81   20          01260         CMPA    #$20
7DDA 25   25          01270         BLO     PULL2
7DDC 81   1F          01280         CMPA    #$1F
7DDE 22   04          01290         BHI     CMP2
7DE0 86   60          01300         LDA     #$60
7DE2 20   20          01310         BRA     PUTIT
                      01320 *TRANSLATE ASCII VALUE TO
                      01330 *SCREEN CHAR VALUE
7DE4 81   3F          01340 CMP2    CMPA    #$3F
7DE6 22   04          01350         BHI     CMP3
7DE8 8B   40          01360         ADDA    #$40
7DEA 20   18          01370         BRA     PUTIT
7DEC 81   5F          01380 CMP3    CMPA    #$5F
7DEE 22   02          01390         BHI     CMP4
7DF0 20   12          01400         BRA     PUTIT
7DF2 81   7F          01410 CMP4    CMPA    #$7F
7DF4 22   0E          01420         BHI     PUTIT
7DF6 80   60          01430         SUBA    #$60
7DF8 20   0A          01440         BRA     PUTIT
7DFA 8C   0600        01450 PULL    CMPX    #$0600
7DFD 26   02          01460         BNE     PULL2
7DFF 8D   18          01470         BSR     SCROLL
7E01 35   34          01480 PULL2   PULS    B,X,Y
7E03 39               01490         RTS
7E04 A7   80          01500 PUTIT   STA     ,X+
7E06 9F   88          01510 FIXCUR  STX     $88
7E08 86   0A          01520         LDA     #$0A
7E0A 20   EE          01530         BRA     PULL
7E0C 108E 6060        01540 BKSPC   LDY     #$6060
7E10 10AF 82          01550         STY     ,-X
7E13 9F   88          01560         STX     $88
7E15 86   0A          01570         LDA     #$0A
7E17 20   E8          01580         BRA     PULL2
                      01590 *CHECK IF SCROLL PROTECTED
                      01600 *AREA IS IN RANGE OF $400
                      01610 *TO $5E0, SCROLL SCREEN
7E19 BE   7D07        01620 SCROLL  LDX     NOSCRL
7E1C 8C   0400        01630         CMPX    #$400
7E1F 25   05          01640         BLO     MAKEX
7E21 8C   05E0        01650         CMPX    #$5E0
7E24 25   03          01660         BLO     SCROL2
7E26 8E   0400        01670 MAKEX   LDX     #$400
7E29 E6   88 20       01680 SCROL2  LDB     $20,X
7E2C E7   80          01690         STB     ,X+
7E2E 8C   05E0        01700         CMPX    #$5E0
7E31 26   F6          01710         BNE     SCROL2
7E33 9F   88          01720         STX     $88
7E35 C6   60          01730         LDB     #$60
7E37 E7   80          01740 LASTLN  STB     ,X+
7E39 8C   0600        01750         CMPX    #$600
7E3C 26   F9          01760         BNE     LASTLN
7E3E 39               01770         RTS
                      01780 *CLEAR TO END OF LINE IF
                      01790 *'ENTER' KEY IS PRESSED
7E3F 96   89          01800 ENTER   LDA     $89
7E41 81   20          01810 COMP    CMPA    #$20
7E43 25   04          01820         BLO     ENT
7E45 80   20          01830         SUBA    #$20
7E47 20   F8          01840         BRA     COMP
7E49 C6   60          01850 ENT     LDB     #$60
7E4B E7   80          01860         STB     ,X+
7E4D 8C   0600        01870         CMPX    #$600
7E50 26   04          01880         BNE     INCRE
7E52 8D   C5          01890         BSR     SCROLL
7E54 20   07          01900         BRA     FINISH
7E56 4C               01910 INCRE   INCA
7E57 81   20          01920         CMPA    #$20
7E59 26   EE          01930         BNE     ENT
7E5B 9F   88          01940         STX     $88
7E5D 35   34          01950 FINISH  PULS    B,X,Y
7E5F CC   0A01        01960         LDD     #$0A01
7E62 39               01970         RTS
```

CHECKING ACCOUNT INFORMATION SYSTEM

Let your CoCo ease the task of managing your checking accounts with CAIS. Record deposits, checks, ATM transactions, interest, service charges and other debit/credit transactions. Reconcile and balance your accounts in minutes. Search and edit capabilities.

Requires 32K and 1 disk drive (min). Printer optional.

To order, send check or MO for 24.95 plus 2.50 S/H to:
(SC res. add 5% sales tax)

After Five Software
P.O. Box 210975
Columbia, S.C. 29221-0975

(Reviewed in RAINBOW April '86 issue, pg. 185)

RAINBOW
CERTIFICATION
SEAL

```
7E63 35    06        01980 NTSCN1  PULS     A,B
7E65 7E    7DC5      01990 NTSCRN  JMP      ORET2
                     02000 *INPUT FROM KEYBOARD OR
                     02010 *RS232 IF DEV=0
                     02020 *USE RSIN FOR REMOTE INPUT
7E68 B6    7D06      02030 IN      LDA      CURSOR
7E6B A7    9F 0088   02040         STA      [$88]
7E6F 0F    70        02050         CLR      <FLAG
7E71 0D    6F        02060         TST      <DEV
7E73 26    5D        02070         BNE      IRET2
7E75 32    62        02080         LEAS     2,S
7E77 34    15        02090         PSHS     B,CC,X
7E79 AD    9F A000   02100 IN1     JSR      [POLCAT]
7E7D 27    02        02110         BEQ      RSCHK
7E7F 20    4F        02120         BRA      NOCHNG
7E81 BD    7E88      02130 RSCHK   JSR      REMIN
7E84 27    F3        02140         BEQ      IN1
7E86 20    42        02150         BRA      IRET1
7E88 F6    FF69      02160 REMIN   LDB      $FF69
7E8B C4    08        02170         ANDB     #$08
7E8D 27    18        02180         BEQ      ZEROA
                     02190 *NEW RS232 INPUT FROM CART
7E8F C4    07        02200 RSAN    ANDB     #$07
7E91 26    14        02210         BNE      ZEROA
7E93 B6    FF68      02220         LDA      $FF68
                     02230 *STORE CHAR IN UPPER RIGHT
                     02240 *CORNER OF SCREEN
7E96 F6    7D01      02250         LDB      CORNER
7E99 27    03        02260         BEQ      CHKBRK
7E9B B7    041F      02270         STA      $41F
                     02280 *CHECK FOR BREAK DISABLE
                     02290 *AND FOR BREAK SIGNAL
                     02300 *FROM REMOTE TERMINAL
7E9E F6    7D00      02310 CHKBRK  LDB      BREAK
7EA1 27    06        02320         BEQ      NOTBRK
7EA3 81    03        02330         CMPA     #$03
7EA5 26    02        02340         BNE      NOTBRK
7EA7 4F              02350 ZEROA   CLRA
7EA8 39              02360         RTS
7EA9 F6    7D04      02370 NOTBRK  LDB      ICASE
                     02380 *CHECK IF CHAR SHOULD BE
                     02390 *UPPER- OR LOWERCASE AND
                     02400 *CHANGE IT ACCORDINGLY
7EAC C1    01        02410 CKCASE  CMPB     #$01
7EAE 26    0B        02420         BNE      CMPB2
7EB0 81    61        02430         CMPA     #$61
7EB2 25    15        02440         BLO      RET2
7EB4 81    7A        02450         CMPA     #$7A
7EB6 22    11        02460         BHI      RET2
7EB8 80    20        02470         SUBA     #$20
7EBA 39              02480         RTS
7EBB C1    02        02490 CMPB2   CMPB     #$02
7EBD 26    0A        02500         BNE      RET2
7EBF 81    41        02510         CMPA     #$41
7EC1 25    06        02520         BLO      RET2
7EC3 81    5A        02530         CMPA     #$5A
7EC5 22    02        02540         BHI      RET2
7EC7 8B    20        02550         ADDA     #$20
7EC9 39              02560 RET2    RTS
7ECA C6    60        02570 IRET1   LDB      #$60
7ECC E7    9F 0088   02580         STB      [$88]
7ED0 35    95        02590 NOCHNG  PULS     B,CC,X,PC
7ED2 7E    7D71      02600 IRET2   JMP      RET
7ED5 34    04        02610 RSOUT   PSHS     B
7ED7 F6    FF69      02620 RSOUT1  LDB      $FF69
7EDA C4    10        02630         ANDB     #$10
7EDC 27    F9        02640         BEQ      RSOUT1
7EDE B7    FF68      02650         STA      $FF68
7EE1 35    04        02660         PULS     B
7EE3 39              02670         RTS
                     02680 *
7EE4                 02690 ZZZZ    *******
           7D32      02700         END      START

00000 TOTAL ERRORS
```

Hint . . .

Multi-Pak Versatility

Many owners of the Multi-Pak Interface (MPI) have found it frustrating that they cannot switch to any of the four slots while remaining in Disk BASIC. Here is a simple method to accomplish this.

The control port at $FF7F controls two cartridge select lines, the CTS and SCS lines. This location contains an 8-bit value. The high-order four bits control the CTS and the low-order four bits control the SCS. The value of each of these nibbles can range from $0 to $3. In rough terms, the CTS nibble selects which slot the processor is using for software and the SCS nibble selects which slot is to be used for I/O.

To select Slot 4 for Disk BASIC and disk I/O, enter `POKE&HFF7F,&H33`. As another example, suppose you want to keep Disk BASIC software but want to perform I/O out of an RS-232 Pak in Slot 2. Then you would enter `POKE&HFF7F,&H31`. The idea is that the first hexadecimal digit represents the slot number for software after subtracting a value of one. The second hexadecimal represents the slot desired for I/O after subtracting a value of one.

Stephen R. Wilson
Riverside, CA

10 FREE DISKS GIVEN FOR EACH PROGRAM PURCHASED

B-FILES
THE NEW EXTRAORDINARY FILE SYSTEM FOR THE BASIC PROGRAMMER

Now for the first time there is a file system which utilizes the 8k of unused memory locate above Disk Basic. B-Files is a file system which does not need an array to dump its date into. Access to any record in the file is done by using only one string variable. Since each file is saved to high RAM and since no array is needed to hold the data, B-Files saves program memory. Example: Load 1111 seven character words into the computer at one time and save a total of 13327 bytes of program memory. Use B-Files to save words, graphic characters, adventure game descriptions, video tape data, or anything else you can think of. B-Files are faster loading than seqential or random files. B-files have already been used in many of our programs which are on the market today. Never before has such a file system been used for the COCO. B-Files comes complete with learning manual and demonstration programs on disk.

64k COCO, COCO II, One Disk Drive $29.98

THE FILE VIEWER

With this program on any of your disk, you'll never have to remember a file name again. Simply call up this program and every file on the disk will be displayed on a Hi-Res. screen. It will also tell you if the file is a Basic, machine language, Basic data, or text editor source file. Simply move the file marker on the screen to the file you wish to load and press ENTER. The file will load and start for you. Also, use File Viewer to name your disk. The disk name will then appear at the top of the Hi-Res screen, above the desk file names. If you have a large library of disks, then you'll need File Viewer, the simple and easy way of loading programs.

64k COCO, COCO II, One Disk Drive, $24.98

SECA, P.O. Box 3134, Gulfport, MS 39505(601) 832-8236

Ms. Res. add 6% sales tax. Include $3 for S/H. Make funds payable to SECA. New authors needed. Dealer inquires welcomed. No Refunds or Exchanges. See previous issues for other software.

10 FREE DISKS GIVEN FOR EACH PROGRAM PURCHASED

EDUCATION NOTES

16K ECB

Word Fun: The Three Bears Come of Age

By Steve Blyn
Rainbow Contributing Editor

Once upon a time, there were three bears. Wait a minute! Why do we always have to hear about bears? Why can't it be chickens or cows instead? Talking cows living in a house in the woods are really no more or less preposterous than talking bears. And, for that matter, can't bears jump over the moon?

This month we have a short, fun program. There is really no skill development intended except to develop familiarity with using language. A one-page screen showing the beginning of *The Three Bears* is shown. Five of the keywords in the story are left out and replaced by stars. At the bottom of the screen is a word list.

The appearance of the program's screen is that of a Cloze exercise. But a Cloze program looks for correct answers. We are hoping only for a pleasant reading experience. Any of the words from the word list may be selected. Use the right-arrow to get the special cursor to the word you want to use and press ENTER.

Any of the words may be inserted anywhere in the story. Use the right-arrow to position the word underneath any part of the story and press ENTER. Make sure the last letter of the chosen word is directly underneath the last letter of the word or star line to be replaced. The word you are using will jump up and take the place of the word above.

Youngsters and slow readers especially enjoy this type of program. There are no right or wrong answers. The child gets an opportunity to manipulate story pieces in a creative experience or a just-for-fun activity. There is no real beginning or end. The child can stop at any time to read his story and continue to edit and change it indefinitely.

The story the child creates can be very sensible, very humorous or absolute nonsense. It really doesn't matter which. We are hoping that the children work on using words and creating original thoughts. Sometimes it seems to take a bulldozer to get reluctant readers to become involved in a story. We found that this type of fun approach can often break the ice with these students. Active and enthusiastic participation is certainly better than reluctance and anxiety, and creates a positive and receptive attitude for the experience.

The program can be ended by the child anytime while selecting a new word. Pressing the letter 'E' clears the screen and ends the program.

Lines 80 to 120 print the original story with the keywords starred out. Line 150 prints the 16 words we have selected to use. They are contained in the DATA lines 380 to 410. These words can be changed, of course, to add variety to the program. The children should be encouraged to come up with alternative sets of suitable or humorous words of their own. These may be substituted by you into the DATA lines.

Lines 170 to 260 contain the routine for going through the choice of words to use. The cursor, CHR$(201), is moved from word to word by pressing the right-arrow key, CHR$(9). If ENTER, CHR$(13), is pressed, then that word is selected. If the 'E' is pressed, the program ends.

Lines 280 to 360 contain the routine for moving the selected word through the story. Line 350 waits for ENTER to be pressed. When it is pressed, the word is inserted in the story immediately above its current position.

We hope your children enjoy working

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

ith this program. We encourage you to elp them alter the data words and even the story itself. This will enable you to create new versions to save and enjoy. Children most enjoy those programs they have had a hand in creating. ☐

```
150 ......205
310 ......254
END .....110
```

The listing: `FUNWORDS`

```
10 REM"FUN WITH WORDS"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1986"
30 C=1
40 GH$=STRING$(32,207)
50 DIM A$(18)
60 FOR T= 1 TO 16:READ A$(T):NEX
T T
70 CLS5
80 PRINT@0,"  ONCE  UPON  A  TI
ME  THERE"
90 PRINT@64,"WERE 3  ****. THEY
 WENT  FOR  A";
100 PRINT@128,"WALK  IN  THE  **
**.  A  LITTLE"
110 PRINT@192,"****  CAME  TO  T
HEIR  ****.SHE"
120 PRINT@256,"JUMPED  ON  THE
BABY'S  ****.  ";
130 PRINT@320,"=======WORD======
===LIST========";
140 PRINT@352," ";:FOR T= 1 TO 4
:PRINT:NEXT T
150 C=1:FOR T= 1 TO 16:PRINT @34
5+(8*T),A$(T):NEXT T
160 J$=CHR$(201)
170 M=352:PRINT@M,J$;
180 B$="BEARS"
190 EN$=INKEY$
200 IF EN$=CHR$(13) THEN GOTO 27
0
210 IF EN$="E" THEN CLS:END
220 IF EN$=CHR$(9) THEN 240
230 GOTO 190
240 K=8:PRINT@M,CHR$(143);:PRINT
@M+K,J$;:M=M+K:C=C+1:B$=A$(C)
250 IF C>16 THEN M=344:C=0:PRINT
@480,CHR$(207);
260 GOTO 190
270 X=1:GOSUB 370:PLAY"O3L25BEG"
:P=34:PRINT@P,B$;
280 EN$=INKEY$
290 IF EN$=CHR$(9) THEN PRINT@P+
X-1,CHR$(207);:PRINT@P+X,B$;:X=X
+1
300 IF P+X=59 THEN P=97:X=0:GOSU
B 370
310 IF P+X=124 THEN P=161:X=0:GO
SUB 370
320 IF P+X=188 THEN P=225:X=0:GO
SUB 370
330 IF P+X=252 THEN P=289:X=0:GO
SUB 370
340 IF P+X=316 THEN P=34:X=0:GOS
UB 370
350 IF EN$=CHR$(13) THEN PRINT@P
+X-33,B$;:PLAY"O4L50CEG":GOSUB 3
70:GOTO 140
360 GOTO 280
370 PRINT@32,GH$;:PRINT@96,GH$;:
PRINT@160,GH$;:PRINT@224,GH$;:PR
INT@288,GH$;:RETURN
380 DATA BEARS,GIRLS,BOYS,COWS
390 DATA SAND,CITY,WOODS,FIELD
400 DATA DOG,GIRL,MOUSE,SMURF
410 DATA HOUSE,ROOM,TOYS,BED
420 DATA ,,
```

BACK TO COMPUTING!

Name Brand **DISKS** **$1.00** DS DD w/ Tyvek Sleeves Buy 5 get **FREE** Case Buy 10—Color Case C-10 Cassettes 59¢	Dot Matrix/Graphics **PRINTER** **$199** Citzen 120D/NLQ Silver Reed DW $289	**SOFTWARE** over 180 titles discounted Games up to 50% Books/Others 20% CoCoMaxII w/Y Cable $95
Composite **MONITORS** start at **$79** 12" Samsung amber 12" Sakata HiRES . . $99 13" Color/Sound . $159	5¼ 40-Track Slim **DISK DRIVES** **$90** DS DD Hi-Tech (U.S.) W/Case/Pwr $139 Teac DS . . . $109	Smart Auto **MODEMS** **$189** 300/1200 Baud Hayes Comp Free Cable!
SYSTEMS **IBM Compatible** **$499** 256K Kit/135W PS/ Enh Keybd/Color/ Flip Case/360K Drive	**MISCELLANEOUS** Keyboards from $25 Disk Cases/60 . . $16 Printer Intf . . . . . $40 Video Driver . . . $24 Power Strip . . . . $16 Swivel Base . . . . $16 Catalog . . . . . Free	**PARTS** •EPROMS •ROMS •CONTROLLERS •MEMORY DRAMS •CABLES •KITS •ICS •PAPER •LABELS •RIBBONS •DAISY WHEELS

POLYGON COMPUTERS
1316 Wilshire Blvd., Suite 206
Los Angeles, CA 90017
(213) 483-8388

Calif. res. add 6½% tax
All prices subject
to change/stock avail.

Shipping Charges:
2% or $3.00 min.
Monitors/Printers
Hardware extra

Derringer Software.

Max Fonts

New for CoCo Max

Now you can have up to 72 fonts for creating dazzling type-set titles and special displays!

3 SETS OF 24 FONTS WHICH ARE OUT OF THIS WORLD!

$24.95 each 3/$64.95

Written by Wally Bayer and Mike Shawaluk

Max Edit

© 1985 Snard Enterprises

A FONT EDITOR FOR COCO MAX

- *Edit current fonts*
- *Create new fonts*
- *Design symbol fonts*
- *Comes with pre-defined fonts*
- *CoCo Max I & II compatible*

$19.95

(Disk Only)

Written by: Michael W. Shawaluk
CoCo Max® is a registered trademark of Colorware.

CoCo's Best & Fastest Spreadsheet

RS-DOS VERSION

FOR 64K DISK SYSTEMS

DYNACALC®

- 51 x 24 Display with Lower Case
- Super-fast Smart Screen Refresh
- Auto-Repeat Keyboard Driver
- Fast 16-Digit Arithmetic with Scientific Functions
- Two-way communications with PRO-COLOR-FILE ★Enhanced★

Serving the Color Computer for 4 Years.

PRO-COLOR-FILE

© 1984 by Derringer Software, Inc.

ENHANCED 2.0

- 60 Data Fields for each record
- 1020 spaces available per record if needed
- Maximizes multiple drive operation
- 28 equation lines (+ − * /)
- IF-THEN-ELSE logic test in equations
- Full Screen editing on up to 4 data entry screens
- Key click and auto key repeat
- Stores custom designed report formats
- Obtain totals, averages, or summaries for any field
- Output reports to printer, screen, or disk file
- Send data out to a DYNACALC compatible file
- Separate label generator for up to 10 across labels
- Pre-define up to 16 indexes for searching/reporting file
- Sorts 750 records in under 5 minutes
- User defined selection menus
- Repeated tasks performed with one keystroke
- Comes with 75 pages of documentation in a 3 ring binder
- Supported by a national users group
- Full time programmer support
- Supplied on an unprotected disk

$59.95

PRO-COLOR-FORMS 2.0

© 1984 by Derringer Software, Inc.

PRO-COLOR-FORMS will access data files created with PRO-COLOR-FILE and merge them with a letter or place them on pre-printed forms.

• STORE UP TO 6 FORMATS • USER DEFINED PAGE SIZE • SUPPORTS SPECIAL PRINTER CONTROL CODES • RIGHT JUSTIFICATION • PASSWORD PROTECTION • MERGES WITH GRAPHICS FROM MASTER DESIGN OR TELEGRAPHICS •

PRO-COLOR-DIR

© 1984 by Derringer Software, Inc.

PRO-COLOR-DIR will read your directories and create a master data file that can be accessed by PRO-COLOR-FILE for sorting and reporting. 1000 + records can be stored on one diskette with valuable information about each program.

You can obtain hard copies of the information and create labels of the filenames for placing on the diskette itself.

• DISK ID NAME • FILENAME/EXT • TYPE OF FILE • DATE CREATED • DATE UPDATED • NUMBER OF GRANS ALLOCATED • NUMBER OF SECTORS ALLOCATED AND USED • MACHINE LANGUAGE ADDRESSES •

$29.95
FOR BOTH

DYNACALC®

SPREAD SHEET FLEXIBILITY
(Includes Dynagraph, Sidewise)

$79.95

Telewriter-64™

WORD PROCESSOR POWER

$59.95

CoCo Max II

GRAPHICS SUPERIOR

$79.95

@ SUMMARY

© 1985 Derringer Software, Inc.

If you use your spreadsheet program to keep track of your expenses then @SUMMARY can help you analyze those expenses. For example, if you indicate a "Category" for each expense then @SUMMARY will produce a report that shows a total for each category, the highest amount, the lowest amount and the average amount. In addition, @SUMMARY can produce a hi-res line graph or bar graph of the analysis and allow you to place titles on the graph. A hardcopy of the graph can also be generated as well as saved to disk.

The analysis can be saved in a "data file" which can be loaded into DYNACALC or read in by @SUMMARY for future additions to the analysis. If you use other Spreadsheets such as ELITE*CALC then you have added a graphing feature to your spreadsheet applications. The analysis can also be saved in an ASCII file which can be read by word processors for inclusion in a report.

@SUMMARY is compatible with any spreadsheet program that can generate an ASCII text file of worksheets.

*Specify RS-DOS or OS9**

(disk only) **$19.95**

**OS9 version does not have Hi-Res graphing and requires Basic09.*

DYNACALC® is a registered trademark of Computer Systems Center
*ELITE*CALC is a trademark of Elite Software*
OS9 is a registered trademark of MICROWARE and MOTOROLA.

SIDEWISE

© 1984 by Derringer Software, Inc.

Add a new "twist" to your printer's capabilities!

SIDEWISE makes your printer do something you never thought possible — print side ways!

SIDEWISE will read in any ASCII text file and print it out side ways using a Radio Shack, Epson, Okidata, C-Itoh or Gemini printers having dot-graphics ability.

SIDEWISE OS9 is compatible with DYNACALC OS9 and requires Basic09

SIDEWISE OS9 (Disk only) **$39.95**

SIDEWISE RS-DOS **$24.95***

* RS-DOS version included FREE with DYNACALC®

OS9 is a registered trademark of MICROWARE and MOTOROLA.

TELEGRAPHICS

© 1984 by Derringer Software, Inc.

PRINT HI-RES GRAPHICS USING TELEWRITER-64!

Use CoCo Max, Graphicom or other graphics programs to create letter heads and print them while using Telewriter-64.

Telegraphics interfaces with Radio Shack, Epson, Gemini, C-Itoh and Okidata printers having dot-addressable graphics. A simple modification to Telewriter-64 will allow you to exit Telewriter via the DISK I/O MENU and print out the graphic without affecting any of your text in the buffer.

This is the same feature that is included in our MASTER DESIGN program. Since we felt you don't need to buy two graphics editing programs, we have made this feature available at a reduced price.

$24.95

(Available Only On Disk)

NO OTHER DISCOUNTS APPLICABLE

MASTER DESIGN

© 1984 by Derringer Software, Inc.

Generates lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. Also interfaces with the Telewriter-64 word processor for printing hi-res displays with your letters.

Take full advantage of all the extended BASIC hi-res graphic commands including boxes, circles, lines, copy displays and utilize GET and PUT features. Added commands include mirror reflection, turn displays backwards or upside down. Squish displays, create dot patterns for shading or diagonal lines.

The Letterhead Utility allows you to access hi-res graphics from Telewriter-64, your own BASIC programs or PRO-COLOR-FORMS.

Interfaces with dot matrix printers having dot addressable graphics.

$29.95

See reviews in:
July '84 Rainbow, Oct. '84 Hot CoCo

Derringer Software, Inc.
PO Box 5300, Florence, SC 29502-5300
To place an order by phone, call: ***(803) 665-5676***
10 AM and 5 PM EDT
Check, Money Order, VISA or MasterCard

South Carolina residents add sales tax.
Include $3.00 for UPS Shipping - $5.00 U.S. Mail - $9.00 Air Mail
Canadian Distributor-Kelly Software
Australian Distributor-Computer Hut Software

CORRECTIONS

"The Meaning of Life" (June 1986, Page 196): William Barden has written to offer a correction for Listing 3, *Driver*, which appears on Page 204. Line 490 should read:

```
490 DATA &HCC,&H7F,&H5F,&HFD
```

"Do-It-Yourself Video Output Board" (September 1986, Page 171): Tim McIntosh has written to correct the article which appeared with his video driver schematic. The article states that the driver will properly drive a color composite monitor as well as a monochrome monitor. This, however, is not the case. The driver will *not* work with a color composite monitor. We thank Tim for this correction and apologize for any inconvenience it has caused.

"The Adventure Processor" (August 1986, Page 26): Bill Cook writes to tell us of an inadvertent omission from his *Adv-Pro* program. Lines 630 and 640 create strings consisting of the first four characters of each verb and object keyword. For proper operation, each verb and keyword must contain at least four characters. The program can be corrected by making the following changes:

```
630 A$="NV="+STR&(NV)+":FORI=1TO
NV":GOSUB172
631 A$="IFLEN(V$(I))<4 THEN V$(I
)=V$(I)+CHR$(32):GOTO"+STR$(LN):
GOSUB172
632 A$="V1$=V1$+LEFT$(V$(I),4):N
EXT":GOSUB172
640 A$="FORI=1TO O":GOSUB172
641 A$="IFLEN(O$(I,2))<4 THENO$(
I,2)=O$(I,2)+CHR$(32):GOTO"+STR$
(LN):GOSUB172
642 A$="N1$=N1$+LEFT$(O$(I,2),4)
:NEXT":GOSUB172
```

A previously generated Adventure can be corrected by adding spaces to verb strings consisting of less than four characters. Object keywords which contain less than four characters and appear in data statements must be enclosed with quotes and additional spaces added to bring the total number of characters to four.

"Junk Food" (November 1984, Page 90): David Taylor has written to offer a modification for *Junkfood.* This modification allows the program to load from disk. Enter the following program, *Jnkfix*, and follow the saving procedures listed after it.

```
10 READ W:IF W=0 THEN20 ELSE POK
E W,4:GOTO10
20 READ W:IF W=0 THEN30 ELSE POK
E W,5:GOTO20
30 READ W,Q:IF W=0 THEN40 ELSE P
OKE W,Q:GOTO30
40 W=16084
50 READ Q:IF Q=0 THEN60 ELSE POK
EW,Q:W=W+1:GOTO50
60 END
100 DATA14572,14583,14593,14599,
14605,14621,14631,14680,14702,14
724,14798,14911,14967,14977,1498
8,15064,15073,15102,0
110 DATA14809,14865,14947,14998,
15041,15114,0
120 DATA12314,126,12315,62,12316
,212,14532,201,14535,202,14578,6
,14637,6,14642,126,14643,62,1464
4,224,0,0
130 DATA183,255,199,183,255,200,
183,255,203,126,48,29,183,255,19
8,183,255,201,183,255,202,126,57
,53,0
```

Enter the program carefully and save it. Then perform the following steps:

1) PCLEAR1 (press ENTER)
2) RUN (Listing 1)
3) RUN (Listing 2)
4) RUN (Listing 3)
5) RUN (Listing 4)
6) RUN JNKFIX
7) SAVEM"JUNKFOOD",12288,16107,12288

Now LOADM *Junkfood* from disk and execute it.

For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG prompt and INFO at the Topic? prompt.

Sugar Software

The CoCo Calligrapher

Use your CoCo, your 8-bit dot addressable graphics printer and the **CoCo Calligrapher** to create beautiful signs, invitations, flyers, greeting cards, diplomas, certificates, awards and love letters.

The original **Calligrapher** letters are 36 points (1/2 inch) high and variably spaced. It includes an easy-to-use, menu-oriented program and these three typestyles:

Old English **Cartoon**

Old English Cartoon

Gay Nineties

Gay Nineties

The CoCo Calligrapher requires 32K ECB.

Tape $24.95/Disk $29.95

ADDITIONAL TYPESTYLES

These tapes of additional typestyles are available for **$19.95 each**. They can be easily moved to disk. ***The original Calligrapher program is required.***

Tape 1 - Reduced, Reversed, and Reduced-Reversed versions

Old English **Gay Nineties** **Cartoon**

uvwxynoldsbabcde

All typestyles on Tapes 2, 3, 4, 5, and 6 include Standard (1/2 inch), Reversed, Reduced, and Reduced-Reversed unless otherwise noted.

Tape 2: Broadway/Old Style

Broadway Oldstyle

Tape 3: Business/Antique

Business Antique

*These disks of additional typestyles are available for **$49.95** each.*

Disk 1 - all type styles on Tapes 1, 2 and 3.

Disk 2 - all type styles on Tapes 4, 5 and 6.

Tape 4: Wild West/Checkers

Wild West Checkers

Tape 5: Star **Hebrew**

Stars שלום

Victorian (Standard and Reverse only)

Victorian

Tape 6: Block/Computer

Block

COMPUTER

The OS-9 Calligrapher

$39.95

Requires OS-9 Version 01.01.00 and a dot matrix printer. **The OS-9 Calligrapher** reads a standard input text file which contains text and formatting directives to produce standard utput for printer or disk. You can specify which font to use; centering; left, right or full justification; line fill; narrow mode; margin; line width; page size; page break and indentation.

*These disks of additional typestyles are available for **$49.95** each.* They are not compatible with the **CoCo Calligrapher** typestyles or program. OS-9 typestyle disk must be used with the **OS-9 Calligrapher.**

Disk 1 - OS-9 version of all type styles on Tapes 1, 2 and 3.

Disk 2 - OS-9 version of all type styles on Tapes 4, 5 and 6.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P.O. Box 11932, Edmonton, Alberta T5J-3L1, (403) 421-8003.

Disk software compatible with Radio Shack DOS only.

SUGAR SOFTWARE
P.O. Box 7446
Hollywood, Florida 33081
(305) 981-1241

A complete catalog of other sweet Sugar Software products is available.

Add $1.50 per program for postage and handling. Florida residents add 5% sales tax. COD orders are welcome. CIS orders EMAIL to 70405, 1374. **No refunds or exchanges.**

MasterCard VISA

CoBBS Message Editor

A useful update for the CoBBS system

By Richard Duncan

The *CoBBS* system was presented in November 1985, and quite a few BBSs use it. There are editors for just about every file in use on the system, except for handling the message base for certain problems or desires. The *CoBBS Message Editor* is written to handle some of the problems that occasionally occur during normal BBS operation.

SMH/EDI goes into the message base and allows the user to modify information contained in the header of that message (e.g., menu number it was posted to, active/deleted, private/public, or the to/from/subject information). In addition, there is a renumbering routine that allows a sequential assignment of message numbers starting at whatever the SysOp designates.

The routine can be used offline and does not require that the driver be loaded. There is no error trapping or checking for carrier detect. This editor would normally only be used by the SysOp and would not require these features. Error trapping and carrier check could easily be added to the routine if required.

Booting Up

On running *SMH* the routine checks the drives assigned to three files: MENU/SYS, HDR/SYS and MSG/SYS. These values will not be correct if the editor is run before the BBS system itself has been booted. When this occurs, you are asked which drive each file is on. Once this is taken care of, the system loads in the name of the various menus you have on the board and then goes directly into the editor.

A menu is displayed before any message information. This is the help menu and can be seen or redisplayed by using the H command. There are 16 commands available.

Move Options

There are five commands that affect movement around the message base. Two commands, + and –, move forward or backward respectively through the message base. The GOTO command locates a particular message number within the base if available. ALL messages are displayed whether they are active or deleted.

Richard Duncan built a UHF television station in Little Rock and is currently the director of engineering for the station. He is active in amateur radio [WD5B] and especially interested in packet communications. Richard lives in Little Rock, Arkansas.

Initially, every message is displayed when entering the editor. If you only want to view one particular area (menu number), use the SET MENU command. When prompted, enter the menu number you want to look at. Return to viewing all messages by using this command and responding with `ALL` instead of a menu number.

There is a search feature that thumbs through the header information for a match. The SEARCH option prompts for the string you want a match to. This is a global search that checks the to, from and subject at one time. The search starts from the current location to the end of the file. If a complete search of the message base is desired, go to the first message in the base before starting the search.

Toggles

Four toggle commands are available. The PUBLIC/PRIVT toggle determines whether the message is public or private. A message may be deleted or reactivated by the use of the K and A commands. The KILL command is used to delete the current message and the ACTIVATE command allows a deleted message to be reinstated. A message that has been received can be changed back to waiting on the user to call again by the TOGGLE RCVD command.

Modifiers

Occasionally, there is the need to change the header information of who the message is from, to or its subject. The CHANGE HEADER command allows this. Each particular part of the address is displayed showing what the original information is and requesting the change. If just ENTER is pressed, the current information will be retained, while entering anything on this line causes that part of the address to be changed.

A message can be re-posted to a different menu number by use of the BOARD POST command. Type the new menu number and press ENTER.

There is always a difference in opinion about how a message board should be operated. *CoBBS* was originally set up to sequentially count the number of messages entered from day one. Some operators like to limit or change the overall message count from time to time. Using the RENUMBER command allows the SysOp to change each message in a sequential order. It is best to do this when there are no deleted messages in the base or the renumbering will appear broken to a user and will disappear at the next message purge.

Other Commands

Once the message header appears, the SysOp can then view the message text by using the MESSAGE command. As the text appears, pressing any key stops the scroll and pressing any key again restarts the viewing. Pressing the 'S' key stops the display and returns to the command menu. Scroll control is only available from the keyboard.

The complete message may be dumped at one time to either the screen or the printer with the DUMP MESSAGE command. After selecting this command, choose whether a screen print or printer dump is desired.

The QUIT command allows termination of the message editor and the option of going into BASIC or returning the BBS.

The editor can be used online with the *CoBBS* system. Again, note that there

100	137
215	123
300	142
360	29
470	59
590	115
720	159
840	160
END	63

The listing: `SMH`

```
0 'SMH/EDI BY RICHARD DUNCAN
10 CLEAR 5000
15 DIM BN$(255)
20 DR$(0)="0":DR$(1)="1":DR$(2)=
"2":DR$(3)="3":NU$=CHR$(0):MD=-1
25 CLS:PRINT"      SYSTEM MESSAGE
 EDITOR"
30 FOR X=4670 TO 4673:IFPEEK(X)<
4 THEN 60
35 PRINT:PRINT"ERROR IN DRIVE NU
MBERS"
40 INPUT"MENU/SYS DRIVE";X:POKE4
673,X
45 INPUT" HDR/SYS DRIVE";X:POKE4
670,X
50 INPUT" MSG/SYS DRIVE";X:POKE4
671,X
55 GOTO65
60 NEXTX
65 PRINT:PRINT:PRINT"WAIT....":P
RINT"GETTING MENU: "
70 REM - MENU/SS
75 GOSUB945
80 FOR R=1 TO K2 STEP 4
85 GET#2,R:BN$=M5$:BN=ASC(M1$)
90 PRINTBN;TAB(10);M5$
95 K=INSTR(BN$,NU$):IFK=0THEN K=
LEN(BN$)+1:BN$(BN)=LEFT$(BN$,K-1
)
100 BN$(BN)=LEFT$(BN$,K-1):NEXT
R:BN$(255)="SYSOP MSG"
105 CLOSE:GOSUB895:GOSUB920
110 GET#1,1:RE=CVN(H1$):MH=RE
115 FORB=2 TO K1:GET#1,B:F$=H2$:
GOSUB130:IFMID$(F$,2,1)<>"1"THEN
 RS=CVN(H1$) ELSE NEXT B:RS=RE
120 ML=RS:GET#1,1:R=1
125 GOSUB205:GOTO270
130 REM
135 F=ASC(F$):E=128:F$=""
140 FOR Q=1 TO 8
145 J=INT(F/E)
150 IF J=0 THEN F$=F$+"0"ELSEF$=
```

"The editor can be used online with the *CoBBS* system."

is no error trap or carrier detect while in the message editor. To modify *CoBBS* for online access to this file, follow this procedure: Load *COBBS/SYS*. Retype Line 34 to read `34 LOAD″SMH/EDI″,R`. Save *COBBS/SYS*.

The message editor returns to *CoBBS* by using the QUIT command and answering 'Y' to the option. There are no other modifications required. Save this editor on Drive 0 under the filename SMH/EDI.

After the modification is made to *COBBS/SYS*, the editor can be called from the BBS by using a type ″ command. No additional data is required.

The *CoBBS* software originally came out last fall in RAINBOW [November 1985, Page 135] and is available through back issues of RAINBOW and RAINBOW ON TAPE.

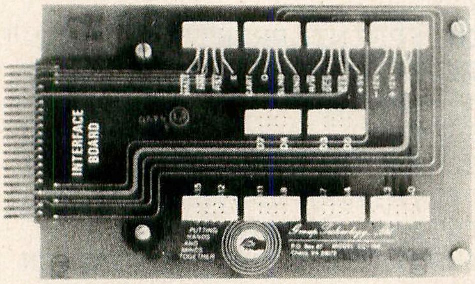
If you are operating a CoBBS system, please send me your phone number, BBS number and hours of operation because I am compiling a directory of *CoBBS* systems. In a future article I will correct some problems in the original *CoBBS* and look at some new additions. My address is 9821 Margie Circle, Little Rock, AR 72209-6521. Please enclose an SASE when writing. All letters will be answered as soon as possible. You can also find me on Delphi (username RICH4COBBS). ☐

```
F$+"1"
155 F=F-(E*J):E=E/2
160 NEXT Q
165 RETURN
170 REM
175 E=1:F=0
180 FOR Q=8 TO 1 STEP -1
185 IFMID$(F$,Q,1)="1"THEN F=F+E
190 E=E*2:NEXTQ:F$=CHR$(F)
195 RETURN
200 GOSUB295
205 PRINT:PRINT
210 IF MD=-1 THENPRINT"ALL MENUS
" ELSE PRINT"MENU:";MD;"/ ";BN$(
MD)
215 PRINT"MESSAGES";ML;"TO";MH
220 PRINT"<+>NEXT MSG #      <G>OTO
"
225 PRINT"<->LAST MSG        <M>ESS
AGE TEXT"
230 PRINT"<?>SEARCH          <P>UBL
IC/PRIVT"
235 PRINT"<K>ILL MSG         <D>UMP
 MESSAGE"
240 PRINT"<A>CTIVATE MSG     <R>ENU
MBER"
245 PRINT"<B>OARD POST       <S>ET
MENU"
250 PRINT"<H>ELP MENU        <T>OGG
LE RCVD"
255 PRINT"<C>HANGE HDR       <Q>UIT
260 RETURN
265 GOSUB295
270 LINEINPUT"COMMAND: ";CH$
275 IFCH$=""THEN265
280 ON INSTR("+-GM?PKDARCQHSBT",
CH$)+1 GOTO 270,370,395,420,450,
505,545,575,600,655,680,735,285,
125,795,825,865
285 CLEAR100:LINEINPUT"RETURN TO
 BBS? ";A$
290 X$=LEFT$(A$,1):IFX$="Y"ORX$=
"y"THEN CLOSE:UNLOAD:LOAD"COBBS/
SYS",R ELSE END
295 REM-HDR PRINT
300 IF MD>-1ANDASC(H8$)<>MD THEN
RETURN
305 PRINT#SC:PRINT#SC
310 IF R=1 THENPRINT"SYSTEM RECO
RD #1!"
```

PLUG THIS INTO YOUR COCO

Engage mind and **Connect** the world

(or at least the electrical signals used to control outside devices and instruments)



- **Expansion Connector Breadboard**, CC-100 accesses the data, address, and control buses, $34.95
- **TRS-80 Color Computer Interfacing, With Experiments**, No. 21893, explains and illustrates principles, $14.95
- **Experiment Component Package**, CC-150, contains the parts needed to do the experiments, $67.50

Add $1.50 per item for shipping or **get all three for $105.00** plus $3.00 shipping.
Maryland residents add 5% sales tax.
VISA/Master Card accepted. Call 301-298-5716. Free catalog available.

PUTTING HANDS AND MINDS TOGETHER ™

Group Technology, Ltd.
6925 Dogwood Road
Baltimore, MD 21207

```
315 M0=CVN(H1$):KF=INSTR(H5$,NU$
):MF$=LEFT$(H5$,KF-1)
320 F$=H2$:GOSUB130:IFMID$(F$,2,
1)="1"THENPRINT#SC;"-DELETED-"
325 KT=INSTR(KF+1,H5$,NU$):XX=KT
-KF-1:IFXX<1THEN MT$="":GOTO330E
LSE MT$=MID$(H5$,KF+1,XX)
330 KS=INSTR(KT+2,H5$,NU$):XX=KS
-KT-1:IFXX<1THEN MS$="":GOTO335E
LSE MS$=MID$(H5$,KT+1,XX):PF=0
335 IFMID$(F$,1,1)="1"THENPRINT#
SC,"PRIVATE"
340 IFMID$(F$,3,1)="1"THEN X$="
<RCVD>" ELSE X$=""
345 F5=1:PRINT#SC,"MESSAGE #";M0
;" ";BN$(ASC(H8$))
350 PRINT#SC,RIGHT$(STR$(ASC(LEF
T$(H3$,1))),2);"/";RIGHT$(STR$(A
SC(MID$(H3$,2,1))),2);"/";RIGHT$
(STR$(ASC(RIGHT$(H3$,1))),2);"
 ";STR$(ASC(LEFT$(H4$,1)));":";
355 A$=RIGHT$(STR$(ASC(RIGHT$(H4
$,1))),2):IFVAL(A$)>9THENPRINT#S
C,A$ELSEMID$(A$,1,1)="0":PRINT#S
C,A$
360 PRINT#SC,"FROM: ";MF$:PRINT#
SC," TO: ";MT$;X$:F5=1:F4=1:PRI
NT#SC,"SUBJ: ";MS$:PRINT#SC
365 RETURN
370 REM- +
375 R=R+1:IF R>K1 THEN R=1
380 GET#1,R:SA=0
385 IF MD>-1 AND ASC(H8$)<>MD TH
EN 375
390 GOTO265
395 REM- -
400 R=R-1:IF R<1 THEN R=K1
405 GET#1,R:SA=0
410 IF MD>-1 AND ASC(H8$)<>MD TH
EN 405
415 GOTO265
420 REM- G
425 PRINT:LINEINPUT"MESSAGE #";N
$
430 N=VAL(N$):IF N<ML OR N>MH TH
EN PRINT"OUT OF RANGE.":GOTO270
435 FOR X=1 TO K1
440 GET#1,X:IF CVN(H1$)=N THEN R
=X:GOTO265
445 NEXTX:PRINT"MSG NOT AVAILABL
E":GOTO270
450 REM- M
455 GOSUB460:SC=0:GOTO270
460 R1=CVN(H6$):R2=CVN(H7$)
465 FOR X=R1+1 TO R2
470 GET#2,X:A$=MG$:IFA$=STRING$(
80,255)THENPRINT#SC:RETURN
475 FOR Y=1 TO LEN(A$)
480 PRINT#SC,MID$(A$,Y,1);:X$=IN
KEY$:IFX$=""THEN490
485 IFX$="S"ORX$="s"THEN500ELSEI
FINKEY$=""THEN485
490 NEXTY
495 NEXTX
500 PRINT#SC:RETURN
505 REM- ?
510 U=R:PRINT:LINEINPUT"SEARCH S
TRING: ";S$
515 IF S$=""THEN270
520 FOR X=U+1 TO K1
525 GET#1,X
530 IFINSTR(H5$,S$)>0 THEN R=X:G
OTO265
535 NEXT X:GET#1,U
540 PRINT"NOT FOUND.":GOTO270
545 REM- P
550 F$=H2$:GOSUB130
555 IFMID$(F$,1,1)="1"THENMID$(F
$,1,1)="0":GOTO565
560 MID$(F$,1,1)="1"
565 GOSUB170:LSET H2$=F$
570 PUT#1,R:PRINT:GOTO270
575 REM- K
580 F$=H2$:GOSUB130
585 MID$(F$,2,1)="1":GOSUB170
590 LSET H2$=F$:PUT#1,R
```

TOTHIAN SOFTWARE

COCO TESTEM

Make multiple choice, matching, true/false, completion, short answer tests. Complete randomizing function. Requires printer with underline ability. Works with tape or disk. 32K ECB tape. $19.95

TEACHER PAK

Both weighted and regular grading, seating charts, alphabetizing, statistical analysis. Works with tape or disk. 16K ECB tape. $34.95

BOTH COCO TESTEM AND TEACHER PAK - $47.95

DISKMAN

Backup, reorganize, and alphabetize RS disk directories. Examine & change sectors. Catalog disk files. Printouts. 32K disk. $21.95

HOMEWARE

Versatile home management package. Use with tape or disk. Five 16K ECB/ML modules on tape:
CALENDAR - Draw calendars. Various formats.
SAVINGS/LOANS - Personal finance calculators.
DIRECTORY - Keep track of phone numbers, addresses, etc. Print address labels.
INVENTORY - For home records, hobbies, etc.
HOME-WRITER - Simple ML word processing.
Single modules: $19.95 Whole set: $49.95

Pa. residents add 6%. Send check or money order - no cash - to:

Tothian Software, Inc.
Box 663
Rimersburg, Pa. 16248

```
595 GOTO270
600 REM- D
605 PRINT:PRINT
610 PRINTTAB(5);"1-SCREEN"
615 PRINTTAB(5);"2-PRINTER"
620 LINEINPUT"       >";CH$
625 ONINSTR("12",CH$)+1 GOTO 270
,630,635
630 SC=0:GOTO640
635 SC=-1
640 GOSUB295
645 GOSUB460
650 GOTO270
655 REM- A
660 F$=H2$:GOSUB130
665 MID$(F$,2,1)="0":GOSUB170
670 LSET H2$=F$:PUT#1,R
675 GOTO270
680 REM- R
685 PRINT:PRINT"MESSAGE RENUMBER
!"
690 LINEINPUT"STARTING NUMBER: "
;S$:S=VAL(S$)
695 IF S=0 THEN 270 ELSE ML=S
700 S=S-1
705 FOR X=2 TO K1
710 GET#1,X:S=S+1:LSET H1$=MKN$(
S)
715 PUT#1,X:NEXTX
720 GET#1,1:LSET H1$=MKN$(S):PUT
#1,1
725 MH=S
730 GET#1,2:GOTO125
735 REM- C
740 PRINT:PRINT"FROM: ";MF$
745 LINEINPUT"FROM: ";CH$
750 IFCH$=""THEN755ELSEMF$=CH$
755 PRINT"  TO: ";MT$
760 LINEINPUT"  TO: ";CH$
765 IFCH$=""THEN770ELSEMT$=CH$
770 PRINT"SUBJ: ";MS$
775 LINEINPUT"SUBJ: ";CH$
780 IFCH$=""THEN785ELSEMS$=CH$
```

MAILING LIST
DATA INFORMATION PROGRAM

More than just another mailing list program

See Rainbow Reviews August '86, pg. 149

Requires 16K or 64K Tape or 64K Disk System

Price: **$29.95**

CROCKETT SOFTWARE
P.O. Box 1221
St. Ann, MO 63074
(314) 441-9278

We welcome:
Checks
C.O.D. (Add $3.00)

```
785 LSET H5$=MF$+CHR$(0)+MT$+CHR
$(0)+MS$+STRING$(80,0)
790 SA=1:GOTO270
795 REM- S
800 PRINT:LINEINPUT"MENU # OR AL
L: ";CH$
805 IFCH$=""THEN270
810 IFCH$="ALL" THEN MD=-1 ELSE
MD=VAL(CH$)
815 IF MD<0 OR MD>255 THENPRINT"
MENU OUT OF RANGE.":MD=0
820 GOTO270
825 REM- B
830 PRINT:PRINT"PRESENT MENU: ";
BN$(ASC(H8$))
835 LINEINPUT"POST TO #";CH$
840 IFCH$=""THEN270
845 X=VAL(CH$):IFX<0ORX>255THENP
RINT"VALUE OUT OF RANGE":GOTO830
850 PRINT"POSTING TO: ";BN$(X)
855 LSET H8$=CHR$(X):PUT#1,R
860 GOTO270
865 REM- T
870 F$=H2$:GOSUB130
875 IFMID$(F$,3,1)="1"THEN MID$(
F$,3,1)="0":GOTO885
880 MID$(F$,3,1)="1"
885 GOSUB170:LSET H2$=F$
890 PUT#1,R:GOTO270
895 '-OPEN MSGHDR/SYS-
900 F$="HDR/SYS:"+DR$(PEEK(4670)
)
905 OPEN"D",#1,F$,110
910 FIELD#1,5 AS H1$,1 AS H2$,3
AS H3$,2 AS H4$,80 AS H5$,5 AS H
6$,5 AS H7$,1 AS H8$,8 AS SP$
915 K1=LOF(1):RETURN
920 '-OPEN MSG/SYS-
925 F$="MSG/SYS:"+DR$(PEEK(4671)
)
930 OPEN"D",#2,F$,80
935 FIELD#2,80 AS MG$
940 K2=LOF(2):RETURN
945 '-OPEN BOARD MENU-
950 FF$="MENU/SYS:"+DR$(PEEK(467
3))
955 OPEN"D",#2,FF$,250
960 FIELD#2,1 AS M1$,1 AS M2$,1
AS M3$,1 AS M4$,16 AS M5$,230 AS
 M6$
965 K2=LOF(2):RETURN
```

Metric Industries Inc.

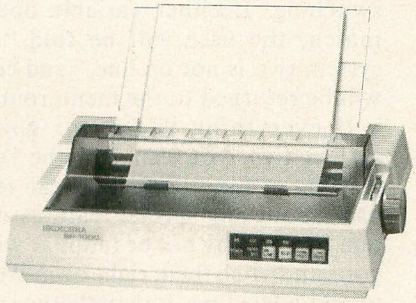
Printer-Interface Package

239.95

***Free shipping**

Compatible with the new COCO3

Seikosha SP-1000A Printer



Printout Sample

```
789:;<=>?@ABCDEF
<=>?@ABCDEFGHIJKLM
789:;<=>?@ABCDEFGHI
/0123456789:;<=>?@ABCDEFGHI
789:;<=>?@ABCDEF
<=>?@ABCDEFGHIJKLM
789:;<=>?@ABCDEFGHI
EFGHIJKL
789:;<=>?@ABCD EFGHIJKLMNOPQ
```

Graphics
6 kinds of horizontal graphic density (480/ 576/640/720/960/1,920 dots/line)

Multiple copies
Original plus 2 copies

Line spacing
1/6, 1/8, 7/72, n/144, n/216 (n = 0-255) inches

Line space feed
6.7 lines/sec (6 lines/inch).
10 lines/sec (9 lines/inch).

Paper width
Pin and friction (4″ to 10″).

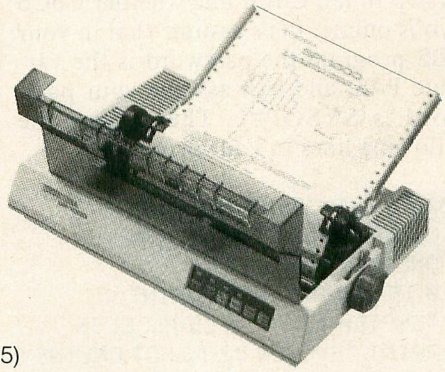
Dimensions
390W × 119H × 278D(mm) with tractor (15.4W × 4.7H × 10.9D inches)

Weight
4.9kg (10, 9 lbs)

Features of SP-1000A

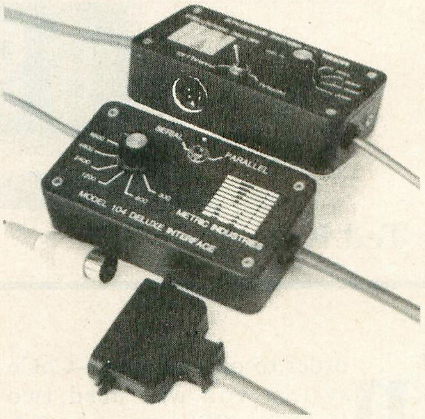
- Centronics parallel.
- Impact dot matrix method, bi-directional in logic seeking, uni-directional in graphic printing.
- 100 (Draft mode), 20 cps (Near Letter Quality) print speed, with reduced noise level.
- Pin-feed or friction-feed.
- Automatic paper loading function.
- A variety of functions including Under line, Bold print, Double striking.
- A variety of print character sets including Pica, Elite, Italics, Super/Subscripts, Proportional, Elongated, Condensed, and Italic Super/Subscripts.
- Standard 1.5K buffer.

Printer is covered with a two-year warranty.



Call for prices on the SP-1000A and other Seikosha printers.

Metric Industries Model 104 Interface with Modem Switch



The Model 104 is a serial to parallel interface with the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5″ × 2.5″ × 1.25″ and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Interface is covered with a one-year warranty.

Ordering Information

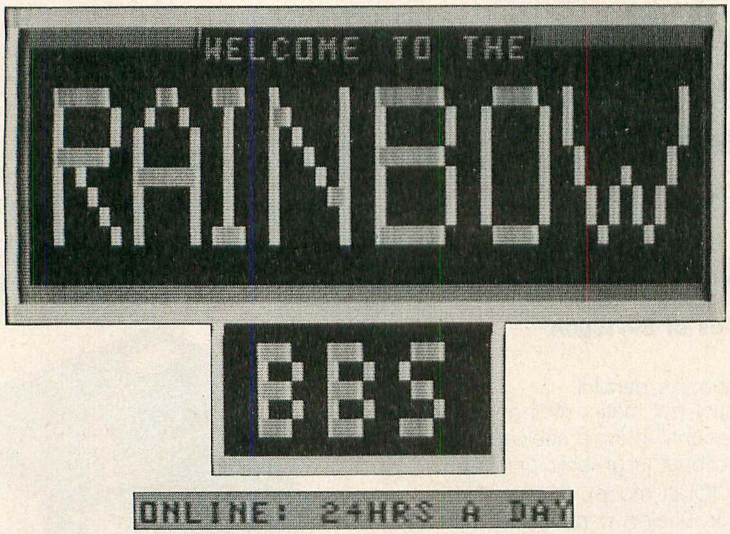
*Free shipping and insurance in the United States except Alaska and Hawaii.

Ohio residents add 5.5% sales tax.

Call (513) 677-0796 and use VISA, MASTERCARD or C.O.D. or send check or money order to:

Metric Industries Inc.
P.O. Box 42396
Cincinnati, Ohio
45242

A switching system for your BBS



WELCOME TO THE
RAINBOW
BBS
ONLINE: 24HRS A DAY

By Ted Kyte

In order to operate a two-CoCo system you will need two CoCos, a BBS program, disk drives (as many as you like on each system), and an auto-answer type modem.

The system I run has four single-sided Radio Shack disk drives on the first CoCo and two double-sided Qumes on the second CoCo.

I run *OCCCS BBS* (Online Color Computer Comunications System), written by Steve Odneal, and *ASCII Express*, written by Erik Gavriluk and Greg Miller. The reason for this is that the *OCCCS BBS* program is a complete BBS program to run the main system, and the *ASCII Express* is an in-memory BBS system which leaves all the disk drives free for downloads. On CoCo number one there are two drives for downloads and two drives to handle the system and mail. This leaves CoCo number two with four drives for downloads, for a total of six download drives.

Ted Kyte is 35 years old and lives in Blairmore, Alberta. Ted owns his own Rewind business which he has been operating for 12 years. He has three CoCos and has written some specialized business programs that may be marketed in the future.

The Program

The line numbers I am using are for example purposes only. Do not use line numbers that already exist in your BBS programs unless you know what you're doing.

The *OCCCS BBS* program has been edited to add a function that permits the SysOp to tell CoCo one whether CoCo two is online. Let's assume that in your BBS program the password is the variable PA$, and let's assume your password is SYSOP#1. Then insert the following lines in your program:

```
500 IF PA$="SYSOP#1" THEN
  LINEINPUT "IS SYSTEM #2
  ONLINE Y/N;"SS$
510 IF SS$="Y" THEN PRINT
  "SYSTEM #2 IS ON LINE" ELSE
  PRINT "SYSTEM #2 IS NOT ONLINE"
```

When the SysOp logs on, this enables him to activate access to CoCo two. This can be also be done from a remote terminal. If the power on/off switch is not on and you activate access to CoCo two, then a user attempting to go to CoCo two is quickly logged off.

In your BBS you will have a routine to handle which subroutine the user will go to after making a menu selection. Now let's assume the variable handlir the menu selection is M$. Then yo need to add a line something like this

```
800 IF M$"O" AND SS$="Y" THEN
  GOSUB 1000 ELSE IF M$="O"
  AND SS$<>"Y" THEN PRINT "SORR
  SYSTEM 2 IS NOT ON LINE":
  RETURN
```

In this line we have assumed the routine handling the switch to system two is in Line 1000. If the variable M$ equals O and variable SS$ equals [illegible] then the program control shifts to the routine in Line 1000 to handle the switching. If either variable does not match, the user will be told "Sorry system two is not on line," and control will be returned to the menu routine.

If everything is OK for going to system two, you can add the routine starting at Line 1000. This can tell the user about any special features of system two he may not be familiar with, or you can switch them right over. We have to add a few lines to handle the switching and they should be something like this:

```
1000 PRINT "YOU WILL NOT BE ABLE
  TO LEAVE ANY MESSAGES OR MAIL
  IN SYSTEM 2 SO PLEASE LEAVE THEM
  IN SYSTEM 1 BEFORE YOU GO."
1010 PRINT:LINEINPUT "GO TO
  SYSTEM 2 Y/N";Q$
1020 IF Q$<>"Y"THEN RETURN
1030 PRINT "PRESS <H>"
1040 3 MOTORON:MOTOROFF
1050 GOTO 'LOGOFF ROUTINE'
```

Line 1000 is self-explanatory. Line 1010 is an opportunity for users to back out if they do not want to go to system two. Line 1030 is important; when they are switched to system two, they won't see anything. The user will see `PRESS <H>` as the last thing on his screen before the switch is actually made. This gives them the help list for system two, and they are off and running.

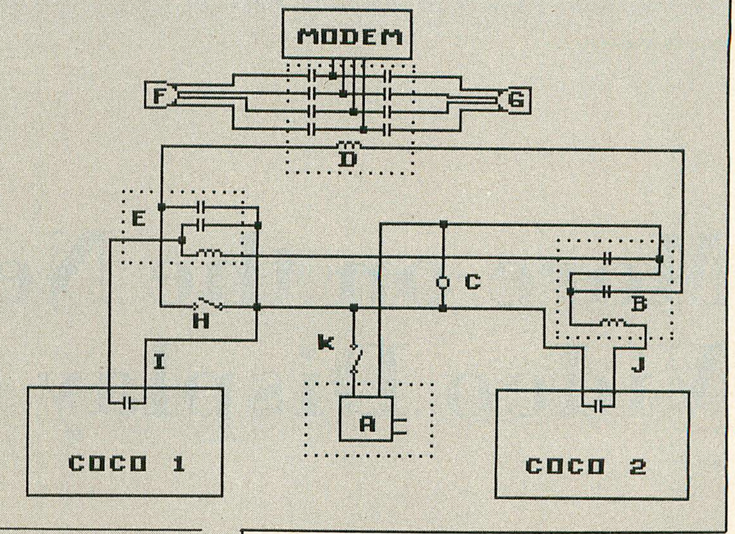
Line 1040 simply makes the modem switch to system two.

Line 1050 sends the control of system one to the logoff routine and restarts system one. You don't have to worry about your modem control codes in the logoff routine because the modem has already been switched to system two and does not see those codes. The reason for logging off system one is to

Parts Description

A)	12-volt adapter	RS# 273-1652
B)	12-volt DC DPDT relay	RS# 275-8206
C)	12-volt DC pilot light	RS# 272-334
D)	12-volt DC DPDT relay	RS# 275-8214
E)	12-volt DC DPDT relay	RS# 275-8206
F)	4-pin DIN male plug	RS# 274-007
G)	4-pin DIN male plug	RS# 274-007
H)	SPST toggle switch	RS# 275-662
I)	Cassette cable	RS# 26-1207
J)	Cassette cable	RS# 26-1207
K)	SPST toggle switch	RS# 275-662
	Utility box	RS# 270-233

Schematic



Component Functions

A) Converts 115-volt AC house voltage to 12 volts DC to operate the low voltage relays.
B) Control relay to switch modem from CoCo two to CoCo one, both contacts are normally closed.
C) Pilot light to indicate power on or off.
D) Main relay to switch modem from CoCo one to CoCo two and back.
E) Control relay to switch modem from CoCo one to CoCo two; both contacts are normally open.
F) Plug to connect main relay to serial port of CoCo one.
G) Plug to connect main relay to serial port of CoCo two.
H) Switch to enable manual or automatic operation.
I) Cassette cable to connect CoCo one cassette relay to switching device. (See special note.)
J) Cassette cable to connect CoCo two cassette relay to switching device. (See special note.)
K) Main power on/off switch.

Utility box holds all components and makes a neat finished project.

speed up the total reset time when system two is logged off. The instant the user is logged off system two, system one is ready for another call.

In system two, the only lines really required to end the whole two-system switching sequence are as follows:

```
700 LINEINPUT "DO YOU REALLY
  WISH TO LOG OFF Y/N";Q$
710 IF Q$<>"Y" RETURN
720 PRINT "THANKS FOR CALLING
  . . . BYE NOW"
730 PRINT CHR$(43);CHR$(43);
  CHR$(43):PRINT "ATS0=1"
740 MOTORON:MOTOROFF
```

Your BBS program probably has a line similar to Line 700. If the user selects 'Y', control is passed to Line 720 for the thank you line, then to Line 730, which needs the codes your modem requires to hang up and be reset to the answer mode.

Sequence of Operation

To start the switching sequence, CoCo one does a `MOTORON`. This closes the internal cassette relay of CoCo one and causes the normally open contacts of relay (E) to close. This activates relay (D) and switches the modem to CoCo two. Then relay (E) acts as its own holding contact as CoCo one does a `MOTOROFF`.

The modem has switched to CoCo two and CoCo one has returned its internal cassette relay back to the open position. However, relay (E) is still in the closed position.

To return the modem to CoCo one, CoCo two must do a `MOTORON`. This opens the normally closed contacts of relay (B) and switches the modem back to CoCo one.

When CoCo one does a `MOTORON` then an immediate `MOTOROFF`, it is sent to the normal logoff sequence the BBS provides. This updates the user log and keeps track of the time and date of last user.

Special Note

The cables (I and J) in the schematic can either be cassette cables with the sub-mini phono plugs that normally go to the remote on the cassette, which can be used with female sub-mini plugs (RS# 274-292) on the switching device, or they can be a separate cable made up with a five-pin DIN male plug (RS# 274-003). Use pins 1 and 3 to go to a sub-mini phono plug (RS# 274-290) then to the female sub-mini (RS#274-292) on the switching device.

On the main switching relay (D) be sure to have the pin numbers matched up. If you take Pin 1 from the modem, it must end up being Pin 1 on both CoCo one and CoCo two when the relay is activated or non-activated.

The cable and plug that runs from the modem to the switching device can be the existing cable your modem has and a female plug to match it on the utility box.

This switching system has been running for about six months on a part-time basis. The hours for a one-CoCo system are 24 hours a day, seven days a week, and for the two-CoCo system, seven days a week, from 12:00 midnight to approximately 3:00 p.m. (MST).

I hope some of the RAINBOW readers will benefit from this little project. I can say it has increased the joys of being a CoCo SysOp.

If any readers would like more information on this system, they can call the Wes-Can Color Board at (403) 564-4118, anytime seven days a week, or write to Ted Kyte, Box 818, Blairmore, Alberta, Canada T0K 0E0.

More on the New Video Display Generator

By Tony DiStefano
Rainbow Contributing Editor

Last month I described the new VDG (Video Display Generator) MC6847T1 and the modes that are possible. I also showed you how to hook up a few switches in order to access these modes. The only problem with this is the new VDG is only available in the CoCo 2 'B' model. At home, I have the regular white CoCo. They call it the 'F' board. I wanted the new T1 chip in my CoCo, too. So, with the help of Bill Warnica, I modified my 'F' board CoCo to work with this new chip.

The new VDG and the old VDG are very similar but not pin-for-pin compatible, so you can't just pull the old one out and plug the new one in. It is, however, not too difficult to modify the computer board to make it fit. The new VDG also has built-in hardware that saves two chips on the computer board. The chips that are saved are no longer on the 'B' board. That is why the new board is smaller than the older boards. The two chip numbers saved are the 74LS244 and 74LS273. These chips are TTL logic gates used to isolate the CPU data bus from the video data bus.

Without getting into too much detail, these two chips are now part of the VDG and are no longer needed on the main board. At first, it was thought that both of these chips had to be removed from the old PC board and the new VDG completely rewired to fit in. Luckily, it turns out that only one of these chips has to be removed. This saves a lot of wiring.

Like most of my projects, this one requires you to open the computer and dig inside with a soldering iron and some tools. A good hardware hacker with experience is needed to do this one. To do this project, you will need a soldering iron, tools, wire, solder and, of course, a new VDG. More on the parts later.

The upgrade I did was on an 'F' board CoCo. As far as I know, these instructions work for just about every CoCo and CoCo 2, but on certain models, the VDG and other parts involved are soldered directly onto the PC Board. That means you have to unsolder the chips and insert a socket. This can be done, and I have done it many times, but it requires a solder sucker or chip remover. Soldering experience is necessary. Also, before you start, be forewarned! The jumpers I will tell you to install in the 'F' board may be different on different boards. But, not all is gloom and doom. A little trial and error and you should find the right pin numbers.

There are two parts you need. The first is the VDG, Motorola part number MC6847T1. If you cannot get this part at your local electronics store, try Radio Shack. The part number is MX-6551. The next part is just a plain and simple resistor. The resistor value is 1K or 1000 ohms quarter watt or half watt. That's it; the rest is a little bit of work.

Unplug the computer, undo the case, remove the keyboard, etc. You know, all those boring things.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

Now comes the fun part. The first thing you must do is remove the VDG. That's simple. It's the chip marked MC6847, or U9 on the 'F' board. On other boards, the U number might be different but it will always be the MC6847. On some boards the VDG is soldered in. In that case, you must unsolder the VDG and insert a 40-pin socket. Prepare the new VDG (T1) in the following manner. Cut the resistor leads so that it will just fit between pins 25 and 11. Put the resistor across the top of the VDG and solder one end of the resistor to the top part of Pin 25. Make sure the solder doesn't leak down the pin. Next, solder the other end to Pin 11 (same precaution). Now pry out Pin 31 vertically, so it does not insert into the socket when you plug the new VDG in.

Insert the new VDG into the socket. Make sure Pin 1 is in the right place. Now solder a short piece of wire-wrap wire to Pin 1 of the VDG. Don't solder the pin to the socket. You won't be able to get the chip out if you do. (If you prefer, solder all connections to these pins before inserting the chip into the socket.) Solder the other end of this wire to Pin 31, the one that you bent up before. Solder a second wire to Pin 12 of the new VDG. Run this wire to Pin 10 of the SAM (Synchronous Address Multiplexer). You remember ol' SAM, she's the one that does all the timing in the CoCo. I did an article on her not long ago in this magazine. Her name is MC6883 or SN74LS783N.

> *"Never connect two outputs together, and never connect two inputs together."*

It was said, by whom I don't know, that you needed the new MC6885 or SN74LS785N SAM in order to make this new VDG work, but this rumor turns out to be false. The old one works just fine. As a matter of fact, I have the old SAM in my CoCo and it just purrs along. Anyway, back to work. Solder a third wire from Pin 13 of the VDG to Pin 12 of the SAM. That's about it for the VDG. But there is a little more work to do.

The next stage of this project deals with the buffer chip I mentioned earlier. Start off by removing the chip, number 74LS273, from its socket. You no longer need this chip, but keep it in your parts bin for a rainy day or in case you decide to remove the modification and replace the old VDG chip. The modification I did is on the so called 'F' board and the 74LS273 chip labeled U13 on the PC board. It also was not soldered in. It had a socket; all I had to do was pull it. If you are doing this on another board and the IC is not socketed, you must do a little more work. First, remove the old chip. Then solder in a 20-pin socket. You need the socket for this next step.

Prepare eight (about 1.5 inches) short pieces of wire by stripping 3/16 inch of insulation off each end. Use a number 22 or 24 gauge solid wire. Old Bell wire is best. Now insert each wire into the pins of the 20-pin socket as follows.

...COMPARE & CHOOSE EITHER THE OWL XTRA OR OWL'S ENHANCED NAME BRAND COMPATIBLE!!!

A FULL COMPATIBLE OR A **1200**
AT LESS THAN A
1000 PRICE!!!

ALL COMPUTERS LISTED INCLUDE 256K & PARALLEL PORT EXCEPT THE TANDY 1000 SX WHICH IS 384K.

	ITEM	OWL XTRA	OWL'S ENHANCED TANDY®1200 HD	TANDY®1000 SX*
STANDARD FEATURES	BASE PRICE	$695.	$795.	$1195.
	SERVICE AVAILABILITY	OWL-WARE OR ANY COMPUTER REPAIR CENTER	OWL-WARE, ANY COMPUTER STORE & RADIO SHACK STORES	RADIO SHACK STORES ONLY
	MONITOR CARD	COLOR OR HIGH RES MONO	COLOR OR HIGH RES MONO	COLOR
	WARRANTY	12 MO PARTS 4 MO LABOR	4 MO PARTS 4 MO LABOR	3 MO PARTS 3 MO LABOR
	PRICE TO INCREASE MEMORY TO 640K	$49.	$89.	$130.
	FLOPPY DRIVES	1 STD 2nd $90.	1 STD 2nd $90.	2 STD
	KEYBOARD	STD-AT STYLE	STD-AT STYLE	NOT INDUSTRY STD
	EXPANSION SLOTS	8 TOTAL-6 LONG	5 TOTAL -5 LONG	5 TOTAL-0 LONG
	HARDWARE COMPATIBILITY	TOTAL	TOTAL	ONLY PARTLY
	MAX 1/2 HGT DRIVES	-4-	-4- **	-2-
	DMA CHIP	STD	STD	OPTIONAL (SUPPLIED WITH MEMORY UPGRADE)
OPTIONS	SERIAL PORT & CLOCK	$59.	$59.	$80. (NO CLOCK)
	HARD DRIVES 10/20/30 MEG	$295./ $409./ $509.	$180. / $419. / $519.	$489. / NA / NA NOTE: OWL-WARE CARD $819.
	20 MEG HARD CARD	$595.	$619.	$795.
	MONITOR MONOCHROME / COLOR	$95. $325.	$95. $325.	$130. $460.
	MSDOS & BASIC	2.1 / $65. 3.2 / $95.	2.1 / $65. 3.2 / $95.	3.2 STD NOTE: MSDOS STD (NO MANUAL)
	TURBO SPEED OPTION	$65.	NA	STD

1 YR. Warranty

PA Residents Include 6% Sales Tax

M.C. & VISA Accepted

CALL
(215) 682-6855 For Info.

MORE SPECIALS

OWL XT

**TANDY®1200 HD normally equipped with full height drives

* Details on 1000 SX from Radio Shack fall catalog / prices & details may change

TANDY is a registered trademark of Tandy Radio Shack Inc.

OWL-Services
P.O. Box 116
Mertztown, PA
19539

CALL FOR LATEST PRICES
(800) 245-6228

NEW

OWL-WARE
WINCHESTER BASIC

ANNOUNCING... the Development of a Major Breakthrough in HARD DRIVE SYSTEMS for the COLOR COMPUTER!!!

Several months ago OWL-WARE introduced the Finest OS9 Hard Drive System for the Color Computer. Now we are about to introduce the only RSDOS Interface System worthy of our computer, OWL-WARE Winchester Basic. For the first time you have available a true Winchester System, although there are 10 directories made available to BASIC, the only limit to size of any file is the size of your drive. On a 10 meg drive you could have a 8 meg file on directory 5 and a 1 meg file on directory 8 and small files everywhere. You turn the computer on and you can immediately access your drive from BASIC or any language using commands you already know. You do not have to know or use OS9 to use OWL-WARE WINCHESTER BASIC, but if you do, all files saved from RSDOS are available to OS9. All files generated from OS9 can be made available to RSDOS by copying to the WINCHESTER BASIC directories. There are no partitions to wall you into, only one operating system, but nothing forces you to use an operating system you don't like.

Call for further details and availability on this breakthrough product!!!

Prices **WITH DRIVE BELOW** **ONLY... $50.** **WITHOUT DRIVE $75.**

OS-9 HARD DRIVE SYSTEMS

Disk Access is at Least... *8 Times Faster than Floppy Drives.*

Control up to 2 Drives. EACH with Continuous Massive Memory!!! Complete OS-9 Hard Drive System Includes... Software, Hard Drive, Controller and L.R. Tech Interface.

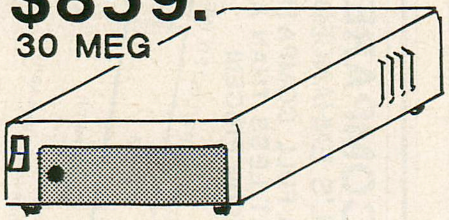
NOTE: OS-9 and RS DOS... "This may prove to be the perfect mating of both systems." RAINBOW (May 86)

NEW PRICING!!! NEW

$599.	$629.	$729.	$859.
10 MEG	15 MEG	20 MEG	30 MEG

Interface & Software Only **$119.**

OWL-WARE is pleased to announce an exclusive arrangement to Distribute the L.R. TECH Hard Drive Interface and Software.



NOTE: Interface is not Interrupt Driven Like Our Competition. Therefore, the System Clock does not Lose Time During Hard Drive Access.

INSTALL IN ANY SLOT OF MULTI-PAK OR USE Y CABLE.

DEALERS INQUIRES INVITED

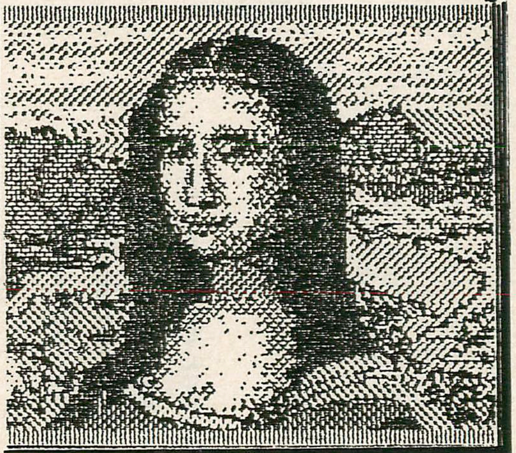
CREATE BEAUTIFUL PICTURES WITH

MASTER ARTIST

vers. 2.0

- Convenient, on-screen menu
- Accepts input from X-PAD, TOUCH-PAD, MOUSE or JOYSTICK
- Magnification mode
- Draw with custom paintbrushes
- Easy free-hand sketching
- "Paint" command
- 10 colors at a time
- Pictures are ready for use in BASIC programs
- Lettering in any size
- Screen dump to Color Ink-Jet or other Tandy printers

64K DISK $29.95



VIEW 3-DIMENSIONAL OBJECTS FROM ANY ANGLE WITH

3D DESIGNER

convenient, on-screen menu
- Supports input from X-PAD, TOUCH-PAD, MOUSE or JOYSTICK
- Built-in screen dump to Tandy printers
- Calculates dimensions for you from just a rough sketch
- Plots or calculates lines and arcs
- On-screen sketching mode

64K DISK $29.95

OWL-WARE'S TOLL FREE ORDER LINE (800) 245-6228

DISK DRIVES

TECHNICAL ADVICE
(215) 682-6855

All Prices Include Case and Power Supply

SHhhh... Ask about the WISPER DRIVE!!!

DRIVE 0 $179. to $239.

...Call for SPECIAL PRICES on Drive 0,1,2,3 Combos.

DRIVE 1 $109. to $145.

Single
Double
Quad

PRINTER SALE

STURDY
Smith Corona
FASTEXT 80

80 CPS with 6 print spacings, graphics and extended character set. Includes serial to parallel printer interface.

ONLY... **$179.**

HALF HEIGHT DRIVE UPGRADE KIT FOR NEW RS SYSTEM

Why only double capacity when you can triple in the same case. KIT INCLUDES: double sided drive to fit in your case, includes hardware and chip to run double sided Takes only 5 minutes

1 YR. WARRANTY
ONLY... **$119.**

All drives are new and fully assembled. We ship *FULLY TESTED and CERTIFIED DRIVES at NO ADDED CHARGE!* CHINON and Other Brands known as the highest quality made.

STATE-OF-THE-ART
TECHNOLOGY

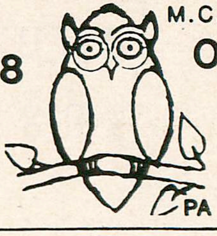
See Special Bundled Software with Disk Drive Purchase!

We have RSDOS, JDOS, OWL DOS, ADOS available on ROM. Call about Double Sided or Special Needs.

WARRANTIES
90 day - 1 YEAR

TOLL FREE ORDER LINE
(800) 245-6228

Call for
LATEST
PRICES!!!



M.C. & VISA Accepted

OWL-WARE
P.O. Box 116-D
Mertztown, PA.
19539

PA Res Include 6% Tax
PA (215) 682-6855

OWL TIP: In answer to your questions:
Our drives also work on the CoCo 3.
Ours have gold contacts and provide more storage per buck

OWL-WARE Software Bundle

Disk Tutorial · Utilities · 2 Games

DISK TUTOR

LEARN EVERYTHING ABOUT DISK BASIC FROM THIS MACHINE LANGUAGE PROGRAM. THE TUTOR TAKES YOU STEP BY STEP THROUGH THE LESSONS AND CORRECTS YOUR MISTAKES A MULTI-LESSON TUTORIAL THAT WILL GIVE YOU QUICK, PAINLESS KNOWLEDGE OF DISK BASIC (THIS PROFESSIONALLY WRITTEN TUTOR IS EASILY WORTH THE BUNDLE'S TOTAL PRICE).

OWL DOS

AN OPERATING SYSTEM THAT GIVES 25% FASTER DISK ACCESS AND ALLOWS USE OF DOUBLE SIDED DRIVES . CORRECTS FLOATING POINT NUMBER ERROR.

COPY-IT

QUICKLY COPIES SELECTED PROGRAMS FROM DISK. USE WILD CARD OPTION SEARCH TO SELECT GROUPS OF PROGRAMS FOR COPY (NOT FOR PROTECTED PROGRAMS)

VERIFY

VERIFIES READING EACH SECTOR. BAD SECTORS ARE LISTED ON THE SCREEN.

2 GAMES

2 GAMES FROM OUR STOCK.
BOTH HAVE SOLD FOR OVER $17. EACH.

IF SOLD SEPARATELY OVER $125.00 WORTH OF SOFTWARE!!!

only $27.95
(or even better)
$6.95 with
DISK DRIVE PURCHASE!!!

One End	Other End
3	12
4	15
7	9
8	6
13	2
14	5
17	16
18	19

Pins 1, 10, 11 and 20 are left empty. Do not connect anything to these pins. (Pin 10 is ground and Pin 20 is the 5-volt supply. You may use them if you need these power connections in other projects.)

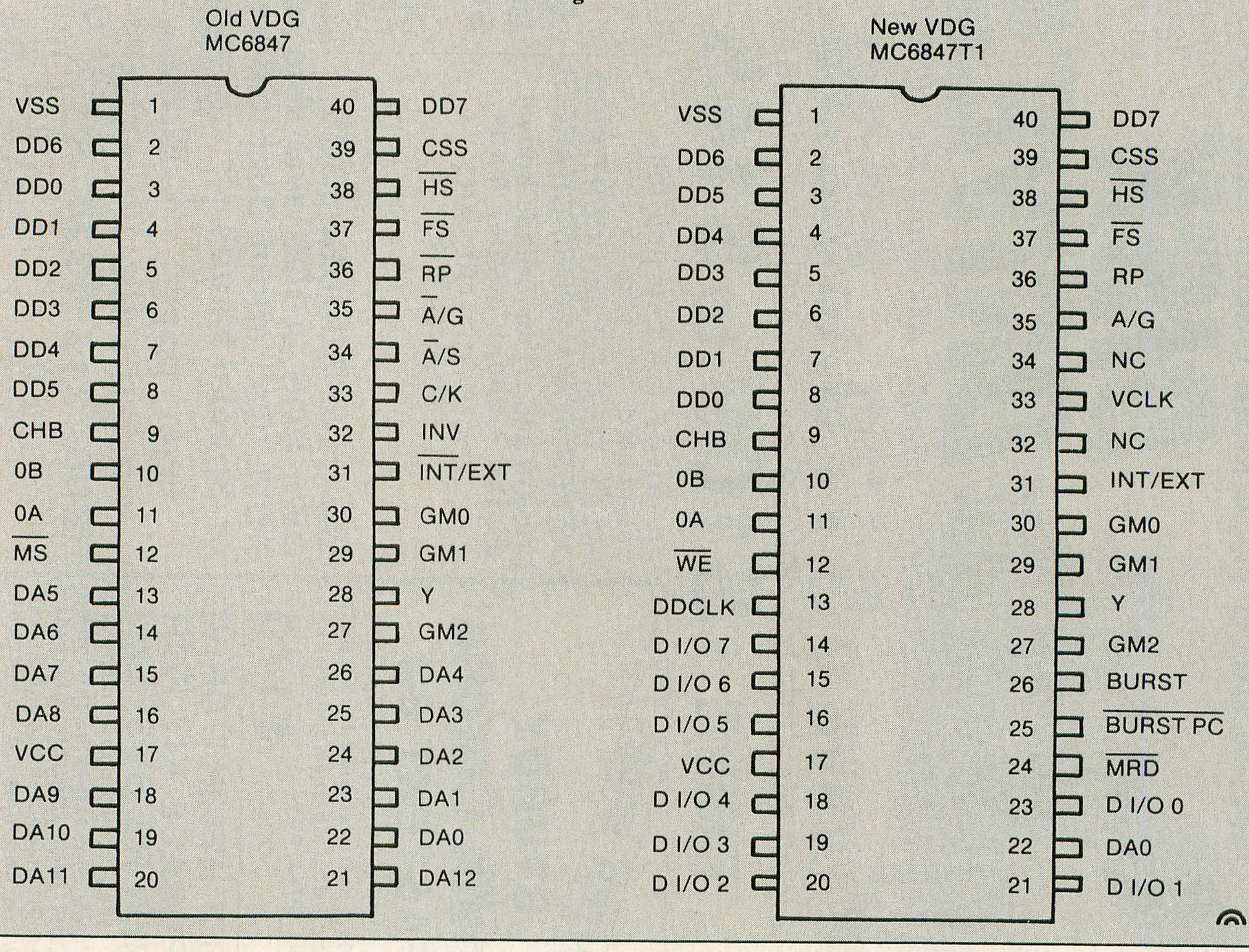
Now, this chip is called an Octal D-type flip-flop. If you recall, many moons (monthly articles) ago, I described flip-flops; they are no more than a sort of latch. This particular chip has eight latches. One for each of the eight data bits of the CPU. Each of these bits has an input and an output. I have arranged the pin numbers in such a way that the One End column pin numbers are all inputs and all the pin numbers in the Other End column are outputs. This is important to know. Notice that one jumper exists for every in/out pair. If you are trying to modify a board other than the 'F' board, the pin numbers may not match. Not having tried all the CoCos and CoCo 2s, I cannot print every pin diagram. Try to wire the connections as they stand above, but if the screen looks confused and you do not get the same letters on the screen you type on the keyboard, it's because the pinout is different.

In that case you will have to do a trial and error method to get the right combination. There are two rules to follow: Never connect two outputs together, and never connect two inputs together. The first may cause permanent damage to your computer. Jumper all eight wires and try it. If it is not right, make note of the combination you did and try another. If you do combinations in order, you will eventually get the right combination. When you do, if you send me the pinout combination and which computer board you did it on, I will print them in the next article I write and give you credit for it.

That's all there is to it! Plug everything back in and turn it on. You now have the new VDG in your CoCo. If you want to access the new modes of the new VDG, you will have to do a little more work. Last month, I wrote on how to access the new modes using switches or software. It works for this modification perfectly. All you have to do is follow the instructions and use the method that suits you best. Next month, I'll show you how to use the new modes without switches. All you will need are a few electronic parts. When you change modes from text to graphics, you won't have to throw all your switches — the electronics will do it for you.

For those who are interested, Figure 1 shows the pinouts of the old and the new VDGs side by side so you can compare the differences between them. ☐

Figure 1


Old VDG
MC6847
VSS 1 40 DD7
DD6 2 39 CSS
DD0 3 38 HS
DD1 4 37 FS
DD2 5 36 RP
DD3 6 35 A/G
DD4 7 34 A/S
DD5 8 33 C/K
CHB 9 32 INV
0B 10 31 INT/EXT
0A 11 30 GM0
MS 12 29 GM1
DA5 13 28 Y
DA6 14 27 GM2
DA7 15 26 DA4
DA8 16 25 DA3
VCC 17 24 DA2
DA9 18 23 DA1
DA10 19 22 DA0
DA11 20 21 DA12
New VDG
MC6847T1
VSS 1 40 DD7
DD6 2 39 CSS
DD5 3 38 HS
DD4 4 37 FS
DD3 5 36 RP
DD2 6 35 A/G
DD1 7 34 NC
DD0 8 33 VCLK
CHB 9 32 NC
0B 10 31 INT/EXT
0A 11 30 GM0
WE 12 29 GM1
DDCLK 13 28 Y
D I/O 7 14 27 GM2
D I/O 6 15 26 BURST
D I/O 5 16 25 BURST PC
VCC 17 24 MRD
D I/O 4 18 23 D I/O 0
D I/O 3 19 22 DA0
D I/O 2 20 21 D I/O 1

Coming to 'Terms' With the CoCo 3

By Rick Adams and Dale Lear

Term 3 is a simple terminal program for the Color Computer 3. It has few features; the purpose of this program is to demonstrate the fact that reliable 1200 Baud RS-232 communication out the CoCo's "bit-banger" port may be obtained by utilizing the programmable interrupt timer included with the Color Computer 3.

Sharp-eyed, technically-oriented users will note that the interrupt routine is driven by setting the new timer at seven times the Baud rate, making the sampling rate on the bit-banger port fast enough for reliable start-bit detection. This luxury is not available on the Color Computer 2. There are only two fixed-rate interrupt clocks built in; one is too fast to use for this purpose, while the other is too slow!

Despite the simplicity of *Term 3*, it does have some things going for it: it supports true upper- and lowercase letters in the 40- or 80-column modes available on the Color Computer 3, and both input and output are fully buffered, allowing type-ahead.

With a little experimentation, Color Computer users with moderate assembly-language experience could add features to this bare-bones communication demo such as ASCII buffer uploading and downloading, use of the function keys (welcome addition) to generate user-defined text strings, and so on.

TERM3.BAS is the BASIC program that pokes a number of communications parameters into memory, loads the machine language portion of the package and starts things going. The comments regarding the parameters are fairly self-explanatory; the defaults shown will do nicely in the majority of cases. (Note that setting the left margin to '2' avoids the problem of the width 40 mode on a TV set causing the first two characters to disappear.)

The assembly language portion of *Term 3* is named *TERM3.BIN*. Users with assembly language experience may use the source listing shown as *TERM3.SRC* (and their favorite assembler) to produce this file.

Perhaps we'll see some of you on Delphi as you take your *Term 3* program out for a test drive through the telecommunications network. We hope to see you there! ☐

Rick Adams is a systems programmer for a company that develops 68000-based systems software. In addition to writing games, he likes science fiction and is the author of Radio Shack's Temple of ROM. *Rick lives in Rohnert Park, California.*

Dale Lear owns Dale Lear Software and makes his living developing programs for the Color Computer. He has authored games and other software such as Double Back, Baseball, TSEDIT, TSWORD *and* D.L. LOGO. *Dale, his wife Laurel and their six children live in Petaluma, California.*

Listing 1: TERM3BAS

```
10 CLS
20 PRINT "=====================
====="
30 PRINT "   TERM3   VERSION 1.0
"
40 PRINT "     COPYRIGHT  1986"
50 PRINT "DALE LEAR  AND RICK AD
AMS"
60 PRINT "======================
======"
70 '
80 '*** PARAMETERS ***
90 '
100 '---DISPLAY MODE---
110 '
120 'NUMBER OF COLUMNS (40 OR 80
)
130 CMAX=40
140 '
150 'NUMBER OF LINES (24)
160 LMAX=24
170 '
180 'LEFT MARGIN (FOR TV)
190 LFMAR=2
200 '
210 'FOREGROUND COLOR (WHITE)
220 FCOLOR=255
230 '
240 'BACKGROUND COLOR (BLACK)
250 BCOLOR=0
260 '
270 '---BAUD RATE---
280 BAUD=1200
290 '
300 'TIMER SET TO 7X BAUD RATE
310 T=INT((14318181/4)/(BAUD*7))
320 T1=INT(T/256)
330 T2=T-256*T1
340 '
350 '---AUTOLF---
360 AUTOLF=0
370 '    0-NO
380 '    1-YES
390 '
400 '---DUPLEX---
410 DUPLEX=0
420 '    0-FULL
430 '    1-HALF
440 '
450 WIDTH CMAX
460 POKE &H200,CMAX
470 POKE &H201,LMAX
480 POKE &H202,LFMAR
490 POKE &H203,FCOLOR
500 POKE &H204,BCOLOR
510 POKE &H205,T1
520 POKE &H206,T2
530 POKE &H207,AUTOL
540 POKE &H208,DUPLEX
550 LOADM "TERM3"
560 EXEC
```

Listing 2: TERM3

```
                    00010 *=============================
                    00020 *   TERM3   VERSION 1.0
                    00030 *     COPYRIGHT  1986
                    00040 *DALE LEAR  AND RICK ADAMS
                    00050 *=============================
                    00060 *
                    00070 * TERM3 IS A SIMPLE TEMINAL
                    00080 * PACKAGE FOR THE COCO 3
                    00090 * UTILIZING THE PROGRAMMABLE
                    00100 * INTERRUPT TIMER TO CONTROL
                    00110 * THE SERIAL PORT.
                    00120 *
                    00130
                    00140 *-----------------------------
                    00150 * EQUIV DEFINITIONS
                    00160 *
          0020      00170 BLANK  EQU 32
          0003      00180 BREAK  EQU 3
          000D      00190 CR     EQU 13
          000A      00200 LF     EQU 10
          0008      00210 BS     EQU 8
          0100      00220 SZOUT  EQU $100 SIZE OF OUTPUT BUFFER
          0100      00230 SZIN   EQU $100 SIZE OF INPUT BUFFER
          0000      00240 ATTR   EQU $0
                    00250 *-----------------------------
                    00260 *DIRECT PAGE COMMON
                    00270 *
0000                00280        ORG 0
                    00290 *--------------------------------
                    00300 *
                    00310 *SCREEN DISPLAY COMMON
                    00320 *
0000                00330 LINCOL
0000                00340 LIN    RMB 1    CUR LINE
0001                00350 COL    RMB 1    CUR COL
                    00360 *-------------------------------
                    00370 * COMMUNICATIONS COMMON
                    00380 *
0002                00390 XSLICE  RMB 1
0003                00400 XBIT    RMB 1
0004                00410 XCHAR   RMB 1
0005                00420 RSLICE  RMB 1
0006                00430 RBIT    RMB 1
0007                00440 RCHAR   RMB 1
0008                00450 BHOLD   RMB 1
0009                00460 XHOLD   RMB 2
                    00470 *-------------------------------
                    00480 * BUFFERED I/O POINTERS
                    00490 *
000B                00500 GETOUT RMB 2
000D                00510 PUTOUT RMB 2
                    00520 *
000F                00530 GETIN  RMB 2
0011                00540 PUTIN  RMB 2
                    00550 *------------------------------
                    00560 * PARAMATERS POKED IN BY BASIC
                    00570 *
0200                00580        ORG $200
0200                00590 CMAX   RMB 1    MAX COL
0201                00600 LMAX   RMB 1    MAX LINE
0202                00610 LFMAR  RMB 1    LEFT MARGIN
0203                00620 FCOLOR RMB 1    FOREGROUND COLOR
0204                00630 BCOLOR RMB 1    BACKGROUND COLOR
0205                00640 BAUD   RMB 2    BAUD RATE CONSTANT
0207                00650 AUTOLF RMB 1    0-NO, 1-YES
0208                00660 DUPLEX RMB 1    0-FULL, 1-HALF
                    00670 *------------------------------
                    00680 *BUFFERS
                    00690 *
4000                00700         ORG $4000
4000                00710 VIDBUF  RMB $1800    SCREEN
5800                00720 INBUF   RMB SZIN     INPUT BUF
5900                00730 OUTBUF  RMB SZOUT    OUTPUT BUF
                    00740
                    00750 *=============================
```

MORETON BAY SOFTWARE

MORE GOOD SOFTWARE

GRAPHICOM
3 disk package $29.95
64K EXB disk

SAM DIAMOND
graphic adventure $29.95
32K EXB disk

HOT SLOT
casino simulation $24.95
32K EXB disk or tape

ECLIPSE
excellent pixel editor . . $19.95
64K EXB disk

GOOD SOFTWARE

THE MOTION PICTURE
Animation tool $39.95
64K Disk Only

FANTASY CLIP ART
Cocomax or Graphicom $14.95
64 K Disk

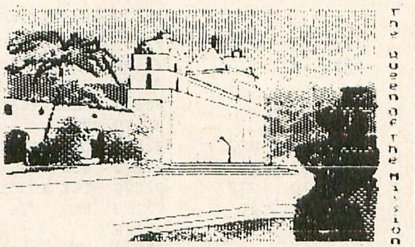
BJORK BLOCKS
Graphics with Animation $34.95
32K EXB Tape

FILE CABINET
Data Base for tape $29.95
16K EXB Tape

COCO WRITER TWO
Tape Version $34.95
16K EXB Tape
Disk Version $44.95
32K Disk

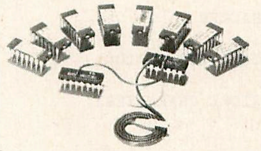
Business Software Call Us

```
   A SUPER COLOR PRINTER
 The  OKIMATE  20
   AT A SUPER LITTLE PRICE!

Prints ten characters to the inch,
welve characters fifteen characters to the inch.
alics. Italics. Italics.

nderline Superscript    Subscript

    Small. Light weight. Quiet.
Prints up to 80 characters per second.
Prints four color graphics.  Includes
Disk software for black and white, two
color and four color screen dumps of
Color Computer hi res graphics.
    Okimate 20, Plug 'n' Print,
paper, black and color ribbon,
nstructions, software and cable for:

Parallel $220.00
$10.00 Shipping
```



The only color Okimate 20 Screen Dump Now Available for the CoCo.

64K UPGRADES



E Board (solderless - pictured) $39.95
F Board $26.95
CoCo 2 (<u>except</u> 26-3134A&B and 26-3136A&B) $26.95
CoCo 2 (models 26-3134A&B and 26-3136A&B $39.95

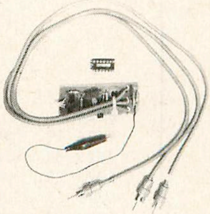
Guaranteed Pretested

Having trouble with your CoCo? We have the chips you need. Call us. (805) 962-3127

SELECTED REPLACEMENT CHIPS FOR THE COCO

The "COCO CORRECTION"	
Chips for U11 and U29	
Presoldered assembly for E boards upgrades.	$12.95
SN74LS785N (The SAM chip)	$28.95
6809E (Microprocessor)	$19.95
6822P (PIA)	$13.95
6821P (PIA)	$ 8.95
1372 (Color Mixing Chip)	$10.95
Extended basic (EXCEPT models 26-3127B, 26-3134A/B and 26-3136A/B	$29.29

DOUBLE DRIVER I



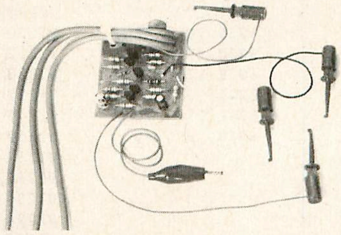
The BEST monitor driver available. Color composite, monochrome and audio output. For original CoCo D, E and F boards. $24.95.

MONO II

Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

$24.95.

DOUBLE DRIVER II



Finally a monitor driver for the Color Computer II that lets you use a monochrome and a color monitor simultaneously. We're proud of this new driver. The six transister circuit provides optimal signal mixing and signal gain. Excellent monochrome output and better quality resolution in the color ouput than any driver we have seen. Audio output also. Fits all models of the Color Computer II. $29.95.

THE COCO-SWITCHER

A QUALITY PIECE OF HARDWARE

The CoCo Switcher allows you to hook up three peripherals to your RS-232 jack. Connect your modem, printer and any other RS-232 compatible peripheral to the CoCo Switcher. An LED on the CoCo Switcher shows if your computer is on or off at a glance. The LED flickers when transmitting or receiving data.

$39.95 plus $2.00 shipping and handling

MORETON BAY SOFTWARE

A Division of Moreton Bay laboratory
316 CASTILLO STREET
SANTA BARBARA
CALIFORNIA 93101
(805) 962-3127

VISA

MasterCard

Ordering information

Send $2.00 shipping and handling per order. We ship within 1 working day on receipt of order. Blue Label Service available. California residents add 6% sales tax.

```
                  00760 *   MAINLINE
                  00770 *==============================
6000              00780      ORG $6000
6000              00790 MAIN
                  00800
                  00810 *-----------------------------
                  00820 *INITIALIZATION
                  00830 *
6000 7F   FF40    00840  CLR $FF40       TURN OFF DISK MOTOR
6003 7F   FFD9    00850  CLR $FFD9       SPEED UP CPU
6006 17   0138    00860  LBSR CLRSCN     CLEAR SCREEN
                  00870 *
                  00880 *                CLEAR I/O BUFFERS
6009 8E   5900    00890  LDX #OUTBUF
600C 9F   0B      00900  STX GETOUT
600E 9F   0D      00910  STX PUTOUT
6010 8E   5800    00920  LDX #INBUF
6013 9F   0F      00930  STX GETIN
6015 9F   11      00940  STX PUTIN
6017 108E 0200    00950  LDY #SZIN+SZOUT
601B C6   FF      00960  LDB #-1
601D              00970 ISET
601D E7   80      00980  STB ,X+    FILL BUFS W/-1'S
601F 31   3F      00990  LEAY -1,Y
6021 26   FA      01000  BNE ISET
                  01010 *
6023 17   016E    01020  LBSR TIMER      START TIMER
                  01030
                  01040 *-----------------------------
                  01050 *BODY OF MAINLINE
                  01060 *
                  01070
6026              01080 LOOP1
6026 17   0035    01090  LBSR RECV  RS232 -> A REG
6029 81   FF      01100  CMPA #-1
602B 27   05      01110  BEQ LOOP2
602D 17   0075    01120  LBSR PUT   A REG -> SCREEN
6030 20   F4      01130  BRA LOOP1  (TIS MORE IMPORTANT TO
                  01140 *           RECIEVE THAN TO TRANSMIT)
                  01150
6032              01160 LOOP2
6032 17   0040    01170  LBSR GET   KEYBOARD -> A REG
6035 81   FF      01180  CMPA #-1
6037 27   ED      01190  BEQ LOOP1
6039 7D   0208    01200  TST DUPLEX SKIP IF FULL DUPLEX(0)
603C 27   03      01210  BEQ LOOP3
603E 17   0064    01220  LBSR PUT   A REG -> SCREEN
6041              01230 LOOP3
6041 17   0002    01240  LBSR SEND  A REG -> RS232
6044 20   E0      01250  BRA LOOP1
                  01260
                  01270 *-----------------------------
                  01280 *SEND CHARACTER TO SERIAL PORT
                  01290 *  (VIA OUTBUF)
                  01300 * ENTER W/ CHAR IN A REG
                  01310 *
6046              01320 SEND
6046 34   02      01330  PSHS A
6048 9E   0D      01340  LDX PUTOUT
604A              01350 SND1
604A E6   84      01360  LDB ,X
604C C1   FF      01370  CMPB #-1
604E 26   FA      01380  BNE SND1 WAIT FOR LAST XMIT
6050 A7   80      01390  STA ,X+  PUT CHAR IN BUFFER
6052 8C   5A00    01400  CMPX #OUTBUF+SZOUT
6055 26   03      01410  BNE SND2
6057 8E   5900    01420  LDX #OUTBUF
605A              01430 SND2
605A 9F   0D      01440  STX PUTOUT
605C 35   82      01450  PULS A,PC
                  01460 *-----------------------------
                  01470 *RCV CHARACTER FROM SERIAL PORT
                  01480 *  (VIA INBUF)
                  01490 * RETURN W/ CHAR IN A REG
                  01500 * -1 IF NOTHING RECEIVED
                  01510 *
605E              01520 RECV
605E 9E   0F      01530  LDX GETIN
6060 A6   84      01540  LDA ,X
6062 81   FF      01550  CMPA #-1
6064 27   0C      01560  BEQ RCV1
6066 C6   FF      01570  LDB #-1
6068 E7   80      01580  STB ,X+
606A 8C   5900    01590  CMPX #INBUF+SZIN
606D 26   03      01600  BNE RCV1
606F 8E   5800    01610  LDX #INBUF
6072              01620 RCV1
6072 9F   0F      01630  STX GETIN
6074 39           01640  RTS
                  01650 *-----------------------------
```

```
                  01660 * GET CHAR FROM KEYBOARD
                  01670 * RETURN W/ CHAR IN A REG
                  01680 * -1 IF NOTHING RECEIVED
                  01690 *
6075              01700 GET
6075 17   0090    01710  LBSR XYCALC
6078 E6   01      01720  LDB 1,X
607A 34   14      01730  PSHS B,X
607C C6   C0      01740  LDB #$C0
607E EA   01      01750  ORB 1,X
6080 E7   01      01760  STB 1,X
6082 AD   9F A000 01770  JSR [$A000]  CALL BASIC KBOARD ROUTINE
6086 27   16      01780  BEQ GET8
6088 84   7F      01790  ANDA #$7F
608A C6   EF      01800  LDB #$EF       CHECK CTRL KEY
608C F7   FF02    01810  STB $FF02
608F F6   FF00    01820  LDB $FF00
6092 C4   40      01830  ANDB #$40
6094 26   0A      01840  BNE GET9
6096 81   3D      01850  CMPA #'=       BASIC KB DRIV GIVES A
6098 27   04      01860  BEQ GET8       PHONY "=" ON CTRL KEY
609A 84   1F      01870  ANDA #$1F      IF DOWN REMOVE BITS 5+6
609C 20   02      01880  BRA GET9
609E              01890 GET8
609E 86   FF      01900  LDA #-1
60A0              01910 GET9
60A0 35   14      01920  PULS B,X
60A2 E7   01      01930  STB 1,X
60A4 39           01940  RTS
                  01950 *-----------------------------
                  01960 * PUT CHAR TO SCREEN
                  01970 * ENTER W/ CHAR IN A REG
                  01980 *
60A5              01990 PUT
60A5 34   12      02000  PSHS A,X
60A7 81   20      02010  CMPA #32
60A9 24   1E      02020  BHS PUT3
                  02030
                  02040 *TEST FOR CONTROL CHARACTER
60AB 81   0D      02050  CMPA #CR
60AD 27   0C      02060  BEQ PUT1
60AF 81   0A      02070  CMPA #LF
60B1 27   12      02080  BEQ PUT2
60B3 81   08      02090  CMPA #BS
60B5 26   1D      02100  BNE PUT9
                  02110
                  02120 *BACK SPACE
60B7 0A   01      02130  DEC COL
60B9 20   17      02140  BRA PUT8
                  02150
                  02160 *CARRIAGE RETURN
60BB              02170 PUT1
60BB F6   0202    02180  LDB LFMAR
60BE D7   01      02190  STB COL
60C0 7D   0207    02200  TST AUTOLF
60C3 27   0D      02210  BEQ PUT8
                  02220
                  02230 *LINE FEED
60C5              02240 PUT2
60C5 0C   00      02250  INC LIN
60C7 20   09      02260  BRA PUT8
                  02270
                  02280 *PRINTABLE CHARACTER
60C9              02290 PUT3
60C9 17   003C    02300  LBSR XYCALC (CALC SCREEN LOC)
60CC A6   E4      02310  LDA ,S
60CE A7   84      02320  STA ,X       (STORE CHARACTER)
60D0 0C   01      02330  INC COL
                  02340
                  02350 *
                  02360 *FIX X-Y LOC
60D2              02370 PUT8
60D2 8D   02      02380  BSR XYFIX
60D4              02390 PUT9
60D4 35   92      02400  PULS A,X,PC
                  02410 *-----------------------------
                  02420 * BRING LINE/COL IN VALID RANGE
                  02430 *
60D6              02440 XYFIX
60D6              02450 XY1
60D6 DC   00      02460  LDD LINCOL
60D8 F1   0200    02470  CMPB CMAX
60DB 24   0C      02480  BHS HICOL
60DD F1   0202    02490  CMPB LFMAR
60E0 25   10      02500  BLO LOCOL
60E2 B1   0201    02510  CMPA LMAX
60E5 24   19      02520  BHS HILIN
60E7 20   1E      02530  BRA XY9
                  02540
                  02550 * COLUMN TOO HIGH,
                     02560 * GO TO NEXT LINE
60E9                 02570 HICOL
60E9 F6    0202      02580  LDB LFMAR
60EC D7    01        02590  STB COL
60EE 0C    00        02600  INC LIN
60F0 20    E4        02610  BRA XY1
                     02620
                     02630 * COLUMN TOO LOW,
                     02640 * GO TO PREV LINE
60F2                 02650 LOCOL
60F2 F6    0200      02660  LDB CMAX
60F5 5A              02670  DECB
60F6 D7    01        02680  STB COL
60F8 0D    00        02690  TST LIN
60FA 27    DA        02700  BEQ XY1
60FC 0A    00        02710  DEC LIN
60FE 20    D6        02720  BRA XY1
                     02730
                     02740 * LINE TOO HIGH
                     02750 * SCROLL
6100                 02760 HILIN
6100 17    0016      02770  LBSR SCROLL
6103 0A    00        02780  DEC LIN
6105 20    CF        02790  BRA XY1
                     02800
6107                 02810 XY9
6107 39              02820  RTS
                     02830 *----------------------------
                     02840 * CALCULATE X/Y SCREEN LOC
                     02850 * ENTTRY LINE/COL
                     02860 * EXIT   X-SCREEN LOC
                     02870 *
6108                 02880 XYCALC
6108 8E    4000      02890  LDX #VIDBUF
610B 96    00        02900  LDA LIN
610D F6    0200      02910  LDB CMAX
6110 58              02920  LSLB (ACCOUNT FOR ATTRIBUTE BYTE)
6111 3D              02930  MUL
6112 30    8B        02940  LEAX D,X
6114 D6    01        02950  LDB COL
6116 58              02960  LSLB (ACCOUNT FOR ATTRIBUTE BYTE)
6117 3A              02970  ABX
6118 39              02980  RTS
                     02990 *----------------------------
                     03000 *SCROLL SCREEN UP ONE LINE
                     03010 *
6119                 03020 SCROLL
6119 8E    4000      03030  LDX #VIDBUF
611C F6    0200      03040  LDB CMAX
611F 58              03050  LSLB (ACCOUNT FOR ATTRIBUTE BYTE)
6120 4F              03060  CLRA
6121 33    8B        03070  LEAU D,X
6123 B6    0201      03080  LDA LMAX
6126 4A              03090  DECA
6127 3D              03100  MUL
6128 1F    02        03110  TFR D,Y
612A                 03120 SCR1
612A EC    C1        03130  LDD ,U++
612C ED    81        03140  STD ,X++
612E 31    3E        03150  LEAY -2,Y
6130 26    F8        03160  BNE SCR1
6132 B6    0200      03170  LDA CMAX
6135                 03180 SCR2
6135 C6    20        03190  LDB #BLANK
6137 E7    80        03200  STB ,X+
6139 C6    00        03210  LDB #ATTR
613B E7    80        03220  STB ,X+
613D 4A              03230  DECA
613E 26    F5        03240  BNE SCR2
6140 39              03250  RTS
                     03260 *----------------------------
                     03270 * CLEAR SCREEN
                     03280 *
6141                 03290 CLRSCN
6141 F6    0203      03300  LDB FCOLOR SET FOREGROUND COLOR
6144 F7    FFB8      03310  STB $FFB8
6147 F6    0204      03320  LDB BCOLOR SET BACKGROUND COLOR
614A F7    FFB0      03330  STB $FFB0
614D F7    FF9A      03340  STB $FF9A  AND BORDER
6150 C6    4C        03350  LDB #$4C
6152 F7    FF90      03360  STB $FF90  SET INITIALIZATION REGISTER
6155 C6    03        03370  LDB #3
6157 F7    FF98      03380  STB $FF98  SET VIDEO MODE REGISTER
615A C6    05        03390  LDB #$5
615C B6    0200      03400  LDA CMAX
615F 81    50        03410  CMPA #80
6161 26    02        03420  BNE CL1
6163 C6    15        03430  LDB #$15
6165                 03440 CL1
6165 F7    FF99      03450  STB $FF99  SET VIDEO RES REGISTER
```

CINSOFT
THE CENTRAL SOURCE FOR COCO SUPPORT

For **Coco** . . .
in the Midwest

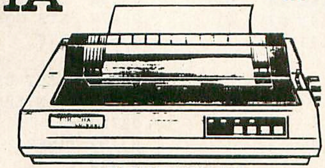
Now in our 4th year!

Fast Delivery...Friendly Service

New Low Prices . . .

SEIKOSHA

SP-1000A



RAINBOW CERTIFICATION SEAL

- 100 cps draft
- 20 cps NLQ
- Friction and tractor
- Front panel Controls
- Graphics
- 1.5 K buffer
- 2 yr. Warranty

REVIEWED IN
OCTOBER 86 RAINBOW

Parallel printer.......... $209.00
with Metric Industries
Model 104 interface..... $249.00
New! With pbh-64 interface with 64K BUFFER! $299.00

Coco Max
The Complete . . .
CoCo Max II System
includes . . .
☑ Deluxe Joystick and Y-cable !! $ 119.95
CocoMax II .... $ 79.95
with Y-cable 99.95
with Joystick 99.95

LATEST VERSION FEATURES . . .
- 14 fonts
- Shrink, Stretch Rotate
- Multiple drives
- Pattern Save

UPGRADES AVAILABLE
Disk I to II 20.00
Tape I to Disk II 25.00
Max Edit 19.95
Picture disks set of 3 29.95

New! **DELUXE JOYSTICK**
FOR COLOR COMPUTER

RAINBOW CERTIFICATION SEAL

- Open gimbal design
- Self-centering or free-floating operation
- Mechanical trim on both axes
- Eight foot cable

DEALER INQUIRES INVITED

REVIEWED IN AUGUST 86 RAINBOW

$27.50 each
$49.95/pair

CHOOSE FROM OUR LARGE SELECTION OF COCO PRODUCTS
B5 ... Colorware ... Derringer ... Diecom ... Dynacaic ... Elite ... Four Star ... HJL ... J & M ... Mark Data ... Metric Industries ... Michtron ... Microcom ... Microworks ... Tom Mix ... PBJ ... PXE ... Spectrum Projects ... Speech Systems ... Sugar ... TCE ... VIP ... Zebra ... and more!
Yes! We have PENPAL!

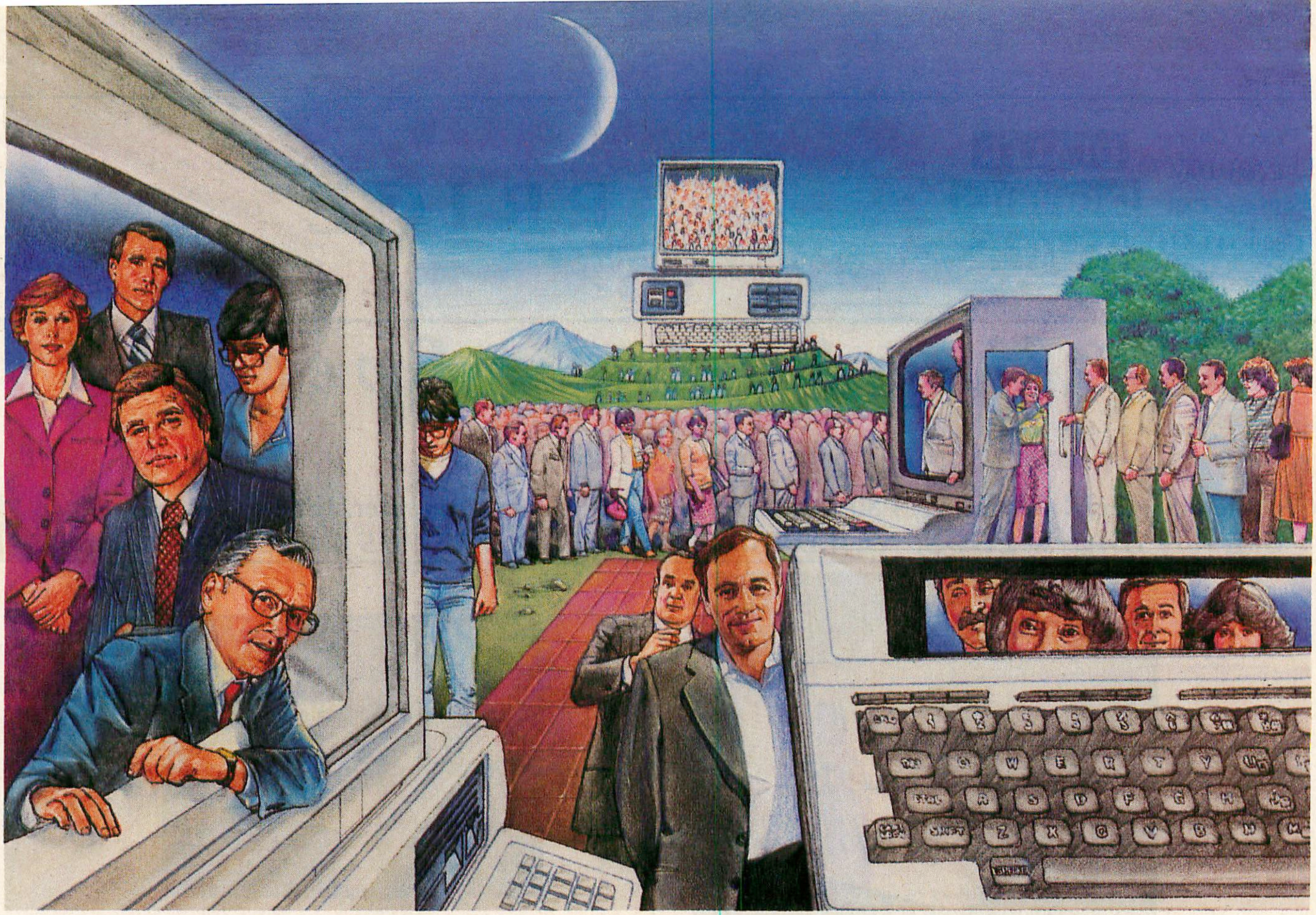
• Call • 513-396-SOFT
• Shop by Modem • 513-396-SHOP

VISA AMERICAN EXPRESS

• Write •
2235 Losantiville, Cincinnati, OH 45237
SHIPPING will be charged at our ACTUAL COST
Ohio residents add 5.5% Sales Tax COD add 2.00

```
6168 CC   4000     03460  LDD #VIDBUF
616B 44            03470  LSRA
616C 56            03480  RORB
616D 44            03490  LSRA
616E 56            03500  RORB
616F 44            03510  LSRA
6170 56            03520  RORB
6171 8A   E0       03530  ORA #$E0
6173 B7   FF9D     03540  STA $FF9D  SET VERT OFFSET REGISTERS
6176 F7   FF9E     03550  STB $FF9E
6179 7F   FF9F     03560  CLR $FF9F
                   03570
617C 8E   4000     03580  LDX #VIDBUF
617F 108E 0780     03590  LDY #80*24
6183 CC   2000     03600  LDD #BLANK*256+ATTR
6186               03610 CL2
6186 ED   81       03620  STD ,X++   CLEAR SCREEN
6188 31   3F       03630  LEAY -1,Y
618A 26   FA       03640  BNE CL2
618C 0F   00       03650  CLR LIN
618E F6   0202     03660  LDB LFMAR
6191 D7   01       03670  STB COL
6193 39            03680  RTS
                   03690 *----------------------------
                   03700 * SET UP PROGRAMMABLE
                   03710 * INTERRUPT TIMER
                   03720 *
6194               03730 TIMER
                   03740 *
                   03750 *SET UP INTERRUPTS
6194 1A   50       03760  ORCC #$50       OFF FOR NOW
                   03770 *
                   03780 *TURN OFF OLD IRUPTS
6196 C6   2C       03790  LDB #$2C
6198 F7   FF01     03800  STB $FF01
619B F7   FF03     03810  STB $FF03
619E F7   FF23     03820  STB $FF23
61A1 F7   FF23     03830  STB $FF23
61A4 F6   FF00     03840  LDB $FF00
61A7 F6   FF02     03850  LDB $FF02
61AA F6   FF20     03860  LDB $FF20
61AD F6   FF22     03870  LDB $FF22
                   03880 *
61B0 30   8D 0029  03890  LEAX DOFIRQ,PCR
61B4 BF   0110     03900  STX $110        SET FIRQ PROGRAM
                   03910 *
                   03920 * SET-UP TIMER INTERRUPT
61B7 C6   60       03930  LDB #$60
61B9 F7   FF91     03940  STB $FF91       SELECT CLOCK
61BC 7F   FF92     03950  CLR $FF92
61BF C6   20       03960  LDB #$20
61C1 F7   FF93     03970  STB $FF93       ENABLE TIMER INTERRUPT
61C4 C6   5C       03980  LDB #$5C
61C6 F7   FF90     03990  STB $FF90       ENABLE GIME FIRQ
61C9 FC   0205     04000  LDD BAUD
61CC F7   FF95     04010  STB $FF95
61CF B7   FF94     04020  STA $FF94       SET UP TIMER COUNT
                   04030 *
                   04040 * INIT XMITTER/RECVR
61D2 0F   05       04050  CLR RSLICE
61D4 0F   02       04060  CLR XSLICE
61D6 0F   06       04070  CLR RBIT
61D8 0F   03       04080  CLR XBIT
61DA 1C   AF       04090  ANDCC #$AF      ENABLE INTERRUPTS
61DC 39            04100  RTS
                   04110 *----------------------------
                   04120 * PROCESS TIMER INTERRUPT
                   04130 *
61DD               04140 DOFIRQ
61DD D7   08       04150  STB BHOLD
61DF 7F   FF93     04160  CLR $FF93       CLEAR TIMER INTERRUPT
61E2 C6   20       04170  LDB #$20
61E4 F7   FF93     04180  STB $FF93
                   04190
                   04200 *
                   04210 *SERVICE TRANSMITTER
                   04220 *
61E7 0A   02       04230  DEC XSLICE
61E9 26   3E       04240  BNE XMI9
61EB 9F   09       04250  STX XHOLD
61ED C6   07       04260  LDB #7
61EF D7   02       04270  STB XSLICE
61F1 D6   03       04280  LDB XBIT
61F3 27   04       04290  BEQ XMI1
61F5 0A   03       04300  DEC XBIT
```

```
61F7 26   20       04310  BNE XMI3
61F9               04320 XMI1
61F9 9E   0B       04330  LDX GETOUT
61FB E6   84       04340  LDB ,X    ON NEXT BYTE IN BUFFER
61FD C1   FF       04350  CMPB #-1    -1
61FF 27   26       04360  BEQ XMI8
6201 D7   04       04370  STB XCHAR   ELSE
6203 C6   FF       04380  LDB #-1
6205 E7   80       04390  STB ,X+
6207 8C   5A00     04400  CMPX #OUTBUF+SZOUT
620A 26   03       04410  BNE XMI2
620C 8E   5900     04420  LDX #OUTBUF
620F               04430 XMI2
620F 9F   0B       04440  STX GETOUT ADVANCE BUFFER POINTER
6211 C6   0A       04450  LDB #10
6213 D7   03       04460  STB XBIT   XMIT 10 BITS
6215 1C   FE       04470  ANDCC #$FE START BIT->CARRY
6217 20   07       04480  BRA XMI4
6219               04490 XMI3
6219 D6   04       04500  LDB XCHAR
621B 1A   01       04510  ORCC #1    STOP BIT->CARRY
621D 56            04520  RORB       DATA BIT->CARRY
621E D7   04       04530  STB XCHAR
6220               04540 XMI4
6220 C6   00       04550  LDB #0
6222 59            04560  ROLB       CARRY->RS232 OUT
6223 59            04570  ROLB
6224 F7   FF20     04580  STB $FF20
6227               04590 XMI8
6227 9E   09       04600  LDX XHOLD
6229               04610 XMI9
                   04620
                   04630 *
                   04640 *SERVICE RECEIVER
                   04650 *
6229 D6   06       04660  LDB RBIT       IF NOT RECEIVING
622B 27   06       04670  BEQ RCI1        GO CHECK FOR START BIT
622D 0A   05       04680  DEC RSLICE     ELSE
622F 27   18       04690  BEQ RCI3        CONTINUE TO RECEIVE
6231 20   3D       04700  BRA RCI9
6233               04710 RCI1
6233 F6   FF22     04720  LDB $FF22  WATCH FOR START BIT
6236 56            04730  RORB
6237 24   04       04740  BCC RCI2
6239 0F   05       04750  CLR RSLICE NO START, CLEAR COUNTER
623B 20   33       04760  BRA RCI9
623D               04770 RCI2
623D 0C   05       04780  INC RSLICE POSSIBLE START, INC COUNTER
623F D6   05       04790  LDB RSLICE
6241 C1   04       04800  CMPB #4    IF 4 X'S, START RECEIVER
6243 26   2B       04810  BNE RCI9
6245 C6   0A       04820  LDB #10    RECEIVE 10 BITS
6247 D7   06       04830  STB RBIT
6249               04840 RCI3
6249 0A   06       04850  DEC RBIT
624B 27   0F       04860  BEQ RCI4   SEE IF FINISHED BYTE
624D F6   FF22     04870  LDB $FF22
6250 56            04880  RORB       DATA BIT->CARRY
6251 D6   07       04890  LDB RCHAR
6253 56            04900  RORB       CARRY->RECV BYTE
6254 D7   07       04910  STB RCHAR
6256 C6   07       04920  LDB #7
6258 D7   05       04930  STB RSLICE SET COUNTER FOR NXT BIT
625A 20   14       04940  BRA RCI9
625C               04950 RCI4
625C 9F   09       04960  STX XHOLD
625E 9E   11       04970  LDX PUTIN
6260 D6   07       04980  LDB RCHAR
6262 E7   80       04990  STB ,X+    DELIVER CHAR TO BUFFER
6264 8C   5900     05000  CMPX #INBUF+SZIN
6267 26   03       05010  BNE RCI5
6269 8E   5800     05020  LDX #INBUF
626C               05030 RCI5
626C 9F   11       05040  STX PUTIN
626E 9E   09       05050  LDX XHOLD
6270               05060 RCI9
6270 D6   08       05070  LDB BHOLD
6272 3B            05080  RTI
                   05090
          6000     05100  END MAIN

00000 TOTAL ERRORS
```



USE THE BRAINS YOUR TANDY WASN'T BORN WITH.

Right at your fingertips in CompuServe's Tandy® Forums.

Our Tandy Forums involve thousands of Tandy users worldwide. These forums will show you just how easy it is to get the most from your Tandy computer.

The **Tandy Professional Forum** supports users of the larger Tandy computers, including the MS-DOS and XENIX operating systems.

The **Model 100/Portables Forum** is for users of Tandy laptop computers, providing functionality and portability in one package.

The **Color Computer Forum** is for the dual personalities of the Tandy Color Computer, the perfect home computer and highly respected microcomputer.

The **OS-9 Forum** provides support to an international group of users linked by a common operating system.

The **LDOS/TRSDOS® Forum** supports users of the LDOS operating system for Tandy Model 1 and 3 computers, as well as TRSDOS-6 users on the Tandy Model 4.

Easy access to free software, including FREE uploads.

- *Download first-rate, non-commercial user-supported software and utility programs.*
- *Upload your own programs free of connect time charges.*
- *Take advantage of CompuServe's inexpensive weeknight and weekend rates (when forums are most active, and standard online charges are just 10¢ per minute).*
- *Go online in most major metropolitan areas with a local phone call.*
- *Receive a* ***$25.00 Introductory Usage Credit*** *when you purchase your CompuServe Subscription Kit.*

Information you simply can't find anywhere else.

Use the Forum Message Board to exchange mail with fellow members. Join ongoing, real-time discussions in a Forum Conference. Scan Forum Data Libraries for free software, documentation and contributions from Tandy enthusiasts.

Enjoy other useful services too, like electronic editions of your favorite magazines, newsletters and articles, including the Tandy Corporate Newsletter and the Fort Worth Computer Chronicles.

All you need is your Tandy computer and a modem . . . or almost any other personal computer.

To buy your CompuServe Subscription Kit, see your nearest computer dealer. Suggested retail price is $39.95. To receive our free brochure, or to order direct, call 800-848-8199 (in Ohio, call 614-457-0802). If you're already a CompuServe subscriber, just type GO TANDYNET at any ! prompt and see what you've been missing.

CompuServe®

Information Services, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, Ohio 43220
800-848-8199
In Ohio, call 614-457-0802
An H&R Block Company

Prices Change
Every Day.
Please Call
1-800-343-8841
For Lower Prices

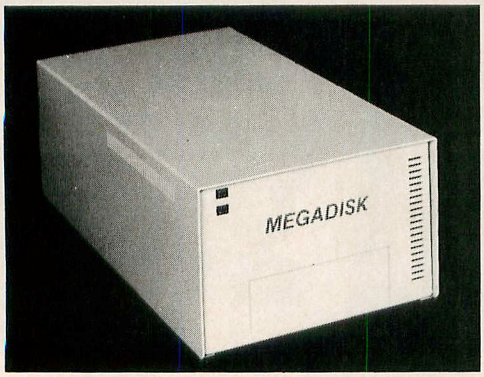
DEALER
INQUIRIES
INVITED

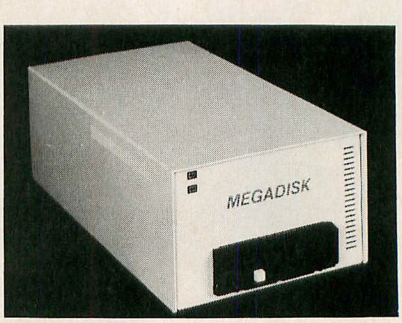
PRICE

Sizzling Summer Specials

Announcing MEGADISK PLUS +

Complete Systems! for the TRS 80 Model I/III/IV/4P, Color Computer, IBM-PC & AT, Max/80
Software Drivers: LDOS, NEWDOS/80, DOSPLUS, TRSDOS 6.x, CP/M available





Drive a 5 to 40 Megabyte Hard Bargain Starting at $399.95

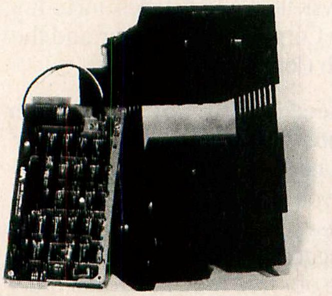
REMOVEABLE CARTRIDGE Systems Now Available!!!

MEGAPLEX your Megadisk — 2 to 10 Port Systems

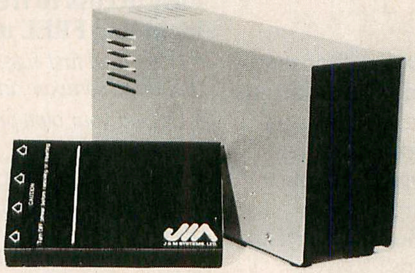
Prices Start at a LOW $199.95

Models III/ IV 4P

Call Toll Free Ordering 1-800-343-8841



$259.95
Disk Drive Upgrade Kit for Model III/IV easy to install system—no soldering. Complete with controller, towers, power supply, 1 Half High Disk Drive, cables, and easy to follow instructions. Second Drive **$89.95**



High Quality Lowest Price Drive 0, 1, 2, 3 for the Color Computer Starting at **$189.95.**

CANADIAN CUSTOMERS PLEASE CALL 514-383-5293

Software Support Inc.

TERMS and CONDITIONS:
All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards.
C.O.D.'s are accepted-No deposit required.
Purchase Orders-Corporate, Government & School P.O.'s are accepted. Please call for details.
Shipping Costs are calculated per order. Please call for total.
Shipments of all in-stock products are made within 24 hours. Same day service is available upon request — no added cost.
Not responsible for typographical errors.
Terms and Specifications may change without notice.

MicroSmart Inc.

OUR NEW ADDRESS

200 Homer Avenue
Ashland, MA 01721
1-617-872-9090

Hours: Mon.-Fri. 10 am to 5:30 pm (est) Sat 4:00 pm

Toll Free Ordering 1-800-343-8841

Dealer Inquiries Invited

Our New Company

Service & Returns: It is our policy to repair all service returns within 24-48 hours. Normally same day turn-a-round is accomplished. It is necessary to have a (R)eturn (M)aterial (A)uthorization to insure speedy service.

IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp, Key Tronics Corp, Compaq Corp, Eagle Computer, Tandy Corp, Zenith Corp, respectively.
© 1986 Software Support, Inc. *All rights reserved.*
© 1986 MicroSmart, Inc.*All rights reserved.*

BREAKTHROUGH

DEALER INQUIRIES INVITED

Prices Change
Every Day.
Please Call
1-800-343-8841
For Lower Prices

MEGADISK™ HARD DISK DRIVE SYSTEMS **TOLL FREE ORDERING 1-800-343-8841**

For the **IBM/PC**, Tandy 1000, **TRS/80 Models I/III/IV/4P**, Compaq, Tava, PC Workalikes, **Color Computers**, Heath/Zenith, Max/80
Complete with Hardware, Cables, Software and Quikfit Installation

WOW! NEW LOW PRICES IMMEDIATE DELIVERY*

5 Megabytes Internal Mount IBM/PC	Starting at	$229.95
11 Megabytes Internal Mount IBM/Tandy 1000	starting at	349.95
22 Megabytes Internal Mount IBM/Tandy 1000	starting at	449.95
5 Megabytes External System	starting at	399.95
10 Megabytes External System	starting at	549.95
20 Megabytes External System	starting at	699.95
Tape Backup System — Internal or External (IBM/PC)	starting at	449.95

DOS Drivers:
IBM/Heath — DOS, 1.0, 2.0, 2.1, 3.0, 3.1 or later
TRS/80-LDOS, TRSDOS 6.x, Newdos/80, Dosplus, CP/M, COCO DOS, Max/80 LDOS, 0S9

FULLY WARRANTEED — PARTS AND LABOR — CALL TOLL FREE - 1-800-343-8841

FLOPPY DISK DRIVES, POWER SUPPLIES AND CABINETS

Our Disk Drives are UL approved — Our Floppy Drive Cabinets and Power Supplies are Underwriters Laboratory Listed and have passed the required Federal Communications Part 15 Section B-EMI/RFI tests.
Warranty on all disk drives is one full year parts and labor. Warranty on floppy disk drive power supplies is five (5) years. In warranty or out of warranty service is 24 hour turn-a-round on all disk drives and power supplies.

Full Height —		
100-1	Single Sided 40 tk Bare	$99.95
	In Case with Power Supply	139.95
	Dual Drives in One Cabinet	239.95
100-2	Dual Sided 40 tk Bare	109.95
	In Case with Power Supply	149.95
	Dual Drives in One Cabinet	259.95
Half High Drives		
	Single Sided 40 tk Bare	79.95
	In Case with Power Supply	119.95
	Dual Drives in One Cabinet	209.95
	Dual Sided 40 tk Bare	**109.95**
	In Case with Power Supply	**149.95**
	Dual Drives in One Cabinet	**259.95**
Apple/Franklin Disk Drives		
	35/40 Track in Case with Cable and Software	129.95

COLOR COMPUTER DISK DRIVE SYSTEMS AND ADD IN PRODUCTS

40 Track Single Head Drive with Case, Power Supply, Cable Controller, Instruction Booklet, Diskettes	$189.95
Above with Dual Drives in One Cabinet	269.95
40 Track Dual Head with Case, Power Supply, Cable Controller, Instruction Booklet, Diskettes	**229.95**
Above with Dual Drives in One Cabinet	**329.95**

CALL FOR MODEM SPECIALS

Modem Special 300/1200....... $199.95

***ALL IN-STOCK ITEMS SHIPPED WITHIN 24 HOURS. SAME DAY SHIPPING PROVIDED BY REQUEST WITHOUT ANY EXTRA HANDLING CHARGES.**

TURBO-M™ PC

FREE—The Wiz™

CALL

TOLL FREE ORDERING

1-800-343-8841

Trademark of MicroSmart, Inc.

PRINTERS

Dot Matrix	
Citizen	$ Call
Star Micronics—N.X. Series	starting at $299.95
Daisy Wheel	
Silver Reed 440 80 Column 12 CPX	315.95
550 132 Column 19 CPS	439.95
770 132 Column 36 CPS	895.00
Olympia 132 Column 14 CPS WITH Form and Tractor Feed	399.95
Printer Cables	starting at 9.95
Printer Paper — Microperf Edge 1000 Sheets	16.95

ELECTRICAL

Surge protectors-Line Filter-6 Outlets with Switch	$29.95
Uninterruptable Power Supplies	399.95

MISCELLANEOUS

Diskettes in 10 Pack	from $7.95
Two print switches	from 49.95
Disk Drive Cables	from 16.00
Maintenance Cleaning Kits	12.00
Parallel Printer Buffers 8K	149.95
Floppy Disk Drive Cables	
1 Drive	16.00
2 Drives	18.95
Heath/Zenith 2 Drive Cables — Shielded	24.95

Software Support Inc.

TERMS and CONDITIONS:
All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards.
C.O.D.'s are accepted-No deposit required.
Purchase Orders-Corporate, Government & School P.O.'s are accepted. Please call for details.
*Shipping Costs are calculated per order. Please call for total.
Shipments of all in-stock products are made within 24 hours. Same day service is available upon request — no added cost.
Not responsible for typographical errors.
Terms and Specifications may change without notice.

MicroSmart Inc.

OUR NEW ADDRESS

200 Homer Avenue
Ashland, MA 01721
1-617-872-9090

Hours: Mon.-Fri. 10 am to 5:30 pm (est) Sat 4:00 pm

Toll Free Ordering 1-800-343-8841

Dealer Inquiries Invited

Our New Company

Service & Returns: It is our policy to repair all service returns within 24-48 hours. Normally same day turn-a-round is accomplished. It is necessary to have a (R)eturn (M)aterial (A)uthorization to insure speedy service.

IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp. Key Tronics Corp. Compaq Corp. Eagle Computer. Tandy Corp. Zenith Corp. respectively.

1986 Software Support, Inc. *All rights reserved*
1986 MicroSmart, Inc. *All rights reserved*
TURBO M ˜ of MicroSmart Inc.

DELPHI BUREAU

Using Mail In the SIG

By Cray Augsburg
Rainbow's CoCo SIGop
Username: RAINBOWMAG

We all know that a lot of time is involved in reading and answering mail. I wanted to find a way to make the job easier, and with a lot of searching, I found a way. That has prompted me to devote this column to some of the features and commands found in Delphi Mail.

For starters, how do we get to Mail? Well, you can enter `MAIL` from the CoCo SIG prompt or the forum prompt. You can also enter `/MAIL` while in conference. Keep in mind that, upon using CONTROL-Z, you return to the area of Delphi from which you entered Mail. In the Mail section you have access to different files, each of which may contain several folders. When entering Mail you will be in your MAIL.MAI file. Within that file, you can create new folders, each of which can hold several letters. This is the basic structure of the Mail system. The default folder on entering Mail is your NEWMAIL folder. It contains any letters that you have not yet read (or received).

To see the messages in your NEWMAIL folder, enter `DIRECTORY`. As with other Delphi commands you can abbreviate this to `DIR`. You should see a complete list of waiting Mail messages. If you don't, then you have no waiting Mail. To see a list of all the folders within your MAIL.MAI file, enter `DIRECTORY/FOLDERS` or `DIR / FOLDERS`. Once you have this list, you can get a directory of one of these folders by entering `DIR` (foldername). This sets your new default folder to the name of the folder you chose and then lists a directory of that folder to your terminal. When you finish and leave the Mail section, if you come back into Mail, your default folder is automatically reset to NEWMAIL.

You say you only have one folder, NEWMAIL, in your MAIL.MAI file? Well, we can correct that situation and make your life a lot easier in the process. When you read a message from another user you have several options. First, you can choose whether or not you want to reply. Then you can either delete or save the message. Deleting a message is easy and gets it out of your hair. When you have finished reading the message and replied to the sender, just enter `DELETE`. The message will be wiped out. But, what if you want to save the message?

Saving a Mail message is just as easy. Instead of typing `DELETE`, enter `FILE` (foldername). This files the message in the folder you specify. If the folder does not exist, Delphi asks if you want to create it. This can come in very handy. I have folders named IMPORTANT, PENDING, TODO, JOKES, OS9, and several others. You get the idea. Create as many folders as you need to keep your mail organized. Now when you do a `DIR`, you will be able to see how your mail setup is structured.

Let's assume you read a message from another user and decide it isn't important, so you delete it. Then your roommate comes in and wants to see the message. What can you do? The Mail system does have safety valves. When you delete a message, it really goes to another folder in your mail system. This folder is named WASTEBASKET. Just enter `DIR WASTEBASKET` and you'll see your deleted messages there, provided you have not used CONTROL-Z to leave Mail. When you delete a message, a special folder named WASTEBASKET is created. All deleted messages in the same Mail session go there. WASTEBASKET is emptied when you press CONTROL-Z.

You can file messages from any folder to another folder. The message appears in the new folder and disappears in the present folder. The only requirement is that you read the message first. Any message you are able to read, you are also able to act on.

If you don't delete or file a message you have just read, where does it go? It goes into another folder named MAIL. It's as simple as that. If you read a message in NEWMAIL and don't delete or file it, it is automatically filed in your MAIL folder on leaving Mail.

To send a copy of a letter to another Delphi user, enter `FORWARD` after reading the message. Delphi asks to which username to send the copy and then asks for the subject. Enter the appropriate responses and the message will be

---

Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

DATABASE REPORT

We have been fortunate in having **Steve Bjork** (6809ER) and **Dale Lear** (DALELEAR) to whom Tandy chose to give CoCo 3s, as frequent visitors to our service. Dale Lear is our OS-9 section leader. Thanks to them, and to Tandy, who released some of their information to the public, we have been able to supply accurate and detailed information about the machine to our members.

Because there has been so much interest in this successor to the CoCo 2, we have created a special topic area (CoCo 3 News) dedicated to news about and programs for the CoCo 3. Among other things we hope to have will be full specifications for the GIME chip, just as soon as Tandy feels comfortable about allowing us to publish them. I also expect that section to be used for folks to report any problems they find with the machine. In the meantime, we should be able to answer many of your questions about it.

One of the most striking additions to our Graphics topic area is a Macintosh copied to the other user. You also retain a copy which you may then file. FORWARD works just like the SEND command, only it acts on a letter you have eceived rather than a new one you want o send. To send a new letter to another user, just enter `SEND` at the Mail prompt. Then, answer the questions and type your letter. When you are finished, press CONTROL-Z to send the etter and return to the Mail prompt.

If you send a letter to someone and would like a copy sent to someone else, here are two things you can do. First, nclude both names at the TO: prompt of the send command. Separate the usernames with commas. You can send a letter to as many people as you want using this technique. Another way to send a copy is to enter `SEND/LAST`. This works just like the SEND command only it sends the same letter you just sent to the first user. This only works if used mmediately after the original SEND. You can also send letters to yourself using any of the above techniques. This s great if you need to keep a copy of an important letter you are sending someone.

To reply to a letter you receive, enter `REPLY` at the Mail prompt following the letter. You are put into the edit mode to create a letter of reply. When you use CONTROL-Z, the reply will be sent to the same person who sent the message.

The READ command is the simplest command in the Mail system, yet it can sometimes be tricky. On entering Mail, you are in the NEWMAIL folder. You can now enter `READ` or just press ENTER. In either case, your oldest unread message scrolls on the screen. Another `READ` or ENTER causes the second oldest message to be read. But, what if you want to read the 12th letter? Just enter `READ 12`. You are taken to the 12th message and subsequent `READ`s or ENTERs take you from there. When you have read the last message in your NEWMAIL file, another `READ` causes the message "No more messages" to appear on the screen. Another `READ` beyond this causes the first message to be read again. The Mail system works in a circle.

The READ command can also be used to change to a new folder. Just enter `READ` (foldername). Your default folder will be changed to the new folder and you'll see the first message filed in that folder come across your screen. If you want to change to a new folder, but don't want to read the first message files there, use `DIR` (foldername).

Next month we'll see another way to select default folders and do many fancy things in the Mail system. We'll try to cover some new features to be found in Workspace. Till then, keep up the experimentation. Now that you have an idea of how Mail works, go in there, enter ? and see some of the other commands. See what they do and how they work. I guarantee you will be amazed with how *sophisticated* the Mail system really is. And it beats U.S. Mail to pieces as far as delivery time is concerned! ☐

Picture Converter, written by **Erik Gavriluk** (ERIKGAV), co-author of *McPaint*. This utility, like the Commodore 64 converter that Eric and I co-authored some time ago, allows CoCo owners to download Macintosh *MacPaint* pictures from bulletin boards, then view those pictures on the CoCo. *MacPaint* pictures may be found on Delphi in the Micro Artists SIG in the Macintosh topic area of the database. Also, I have begun the process of uploading images from the "CoCo Gallery" to the Graphics database for downloading. (These files, unlike the RAINBOW ON TAPE files, are free.)

In the OS-9 topic area Dale Lear has reorganized some of our older files, grouping them more conveniently in logical packages. He's also written an index of all the material in the OS-9 database, which he plans to keep up to date. **Milt Webb** (MILTWEBB) has given us a tutorial for printing horizontal bar graphs to the screen under OS-9. **Bob Montowski** (GRAPHICSPUB) has sent us tutorials for novice OS-9 users. He also has given us some fundamental pieces of an OS-9 BBS system, including RS-232 Pak port drivers, and some extra commands for BASIC09. **Andrew Ellinor** (CROPPER) has uploaded to us an OS-9 terminal program that features Xmodem support, written under BASIC09.

In the General topic area are four new articles by Dale Lear, **Rick Adams** (RICKADAMS), **Cray Augsburg** (RAINBOWMAG) and me. Three of them concern information about the CoCo 3, and one is a humorous account of an adventure Rick and I had.

Don Hutchison (DONHUTCHISON) has uploaded some new material to the Source Code for 6809 Assemblers section. **Larry Wimble** (THEASSEMBLER) has provided us with instructions for putting a pause control on the CoCo.

Our Utilities section is bulging with new additions. **Doug Masten** (DMASTEN) has given us a revised command file for BASIC. Larry Wimble has given us *Demon Dialer, Circuit Drawer*, a BASIC database program, and others. **Jerome Kalkhof** (GRUMCLUB) has given us some modem/buffer printing utilities. **Richard Trasborg** (TRAS) has contributed a disk catalog utility. Milt Webb has given us an encryption program. **Robert E. Pierce** (RPIERCE) has sent us an edit/display utility.

Our Music topic has received over a *hundred* new files in the last month. Dozens of files were contributed by **Scott Milliken** (IDIOT), **Stephen Scherock** (SFSCHEROCK) and **Tom King** (CAPNCRUNCH). Other contributors to the Music topic area this month are **Shawn J. Bush** (SBUSH), **Ned Smith** (NEDSM), **Ray Wright** (RAYWRI), **Jim Brooks** (XANTHA) and **Thomas Patrick Daly** (TPD).

In addition to the Macintosh Converter and "CoCo Gallery" material mentioned, our Graphics topic area has swelled with the addition of over 50 new images and programs. Bob Montowski has been one of the principle contributors, as has Richard Trasborg who has uploaded some studies of the female form by Mike Trammell. **Bruce Henry** (OZ), **John Fitzgerald** (FITZ), Ray Wright and Andrew Ellinor are other contributors.

Loren J. Howell (XENOS) has contributed to our Games topic area *The Catacombs of Yendor*, and Larry Wimble has given us a logic game. **Truman Bryerton** (GRANDAD) has given us *Exit Left* and **Mike Lucash** (MIKELUCASH) has given us *Miner*.

In the Data Communications topic area we have received a new version of *ASCII Express* (Version 2.0) from Erik Gavriluk and **Greg Miller** (GREG MILLER). This is a powerful combination terminal program and mini bulletin board system. **Mike Banks** (KZIN) has given us a list of CoCo bulletin boards, and Greg Miller has sent us a useful disk-to-disk transfer program that sends an entire disk of data from one CoCo to another with error detection and correction.

Don Hutchison, who officially joined our staff last month, has been tirelessly at work enabling new files in the database and uploading past issues of RAINBOW ON TAPE material. We have the past three years of RAINBOW ON TAPE files now available online. **Eric Tilenius** (TILENIUS) has been enhancing the keywords used in the RAINBOW ON TAPE database.

We are staying on top of developments regarding the CoCo 3 on a minute-to-minute basis, while greatly increasing our already huge storehouse of programs, articles and images written for and on the CoCo 1 and 2. Overall, this has been a very active month, and I encourage you to drop by and check us out.

— Marty Goodman
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager

PIPELINE

GO TEAM, GO! *The Professional Football Handicapping System* has been introduced by Software Exchange. This program allows anyone to handicap the weekly NFL games using information found in the daily newspaper's sports section. The system is available on cassette or disk for the Color Computer at $39.95 plus $2 S/H. *For further information, contact Software Exchange, P.O. Box 5382, West Bloomfield, MI 48033, (313) 626-7208.*

ALL SYSTEMS GO A six-outlet surge protector for personal computers has been introduced by MicroComputer Accessories, Inc. (MCA). Designed to protect your system from surges, spikes and noise interference, MCA's Surge Protector cuts power in less than one nanosecond and provides surge protection on all three surge paths. Should power intervention occur, the device can be reactivated with the built-in Reset button. The price is $39.95. *For more information, contact Department L, MicroComputer Accessories, Inc., 5405 Jandy Place, P.O. Box 66911, Los Angeles, CA 90066-0911, (213) 301-9400.*

PAPER CACHE hi-tech Stationery now produces a complete line of business and personal stationery designed for computer systems. The stationery, which comes in a wide variety of patterns, has pinholes down both edges for operation with the tractor-feed mechanism found on most personal printers. Each order contains 50 continuous pages of stationery and 25 #10 envelopes. The price ranges from $5.95 to $9.75. Custom letterhead stationery priced per order. *Contact hi-tech Stationery, 5901 Warner Avenue, Suite 270, Huntington Beach, CA 92649, (714) 840-6038.*

CLEAN SWEEP Ohm/Electronics continues to support its Scooter Products line of protective computer accessories with the introduction of easy-to-use disk drive cleaning kits. Model SCK5.25 is intended for use with 5¼-inch disk drives and includes a cleaning disk and cleaning fluid. The kit also provides for cleaning either single-sided or double-sided drives. Price for the SCK5.25 is $6.95. *Contact Scooter Products, Ohm/Electronics, Inc., 746 Vermont Street, Palatine, IL 60067, (800) 323-2727 (Illinois, call 312-359-6040).*

ON THE MOVE Spectrum Projects has notified us of a recent change of address. The new address is: Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414. The C.O.D. order line number is now (718) 835-1344.

FREE CATALOG Support Systems International Corporation has just released a free catalog for computer cables and accessories. The new catalog covers nearly all necessary items for installing your computer system and runs the gamut from data transfer switches to wall outlet plates. *Free catalogs are available by contacting Support Systems International Corporation, 150 South Second Street, Dept. ES, Richmond, CA 94804, (415) 234-9090.*

BOOKWORM Howard W. Sams & Co. has recently added two new selections to its wide line of technical publications. *Understanding Advanced Solid State Electronics*, a 272-page book, covers such topics as logic cells and arrays, microprocessors, graphics processors, linear integrated circuits and bit-slice systems. Glossary, index and chapter review questions and answers are included in this $14.95 book. John D. Lenk's *Troubleshooting & Repair of Microprocessor-Based Equipment* is another offering from Sams. This 250-page manual, which retails for $21.95, contains general procedures, techniques and tips for troubleshooting equipment containing microprocessors. Topics include test equipment, associated problems in troubleshooting, flip-flop and register troubleshooting, current flow analysis and step-by-step procedure for troubleshooting the VCR. *All Sams Books are available through bookstores, electronic distributors, or directly from Sams by calling (800) 428-SAMS.*

SPEEDSTER The ProWriter Jr. dot-matrix printer from C. Itoh Digital Products has been upgraded to a speed of 120 cps in draft mode, an increase of 14 percent. The compact ProWriter Jr. also features high resolution graphics, one-button selection of near-letter quality and a short paper tear-off capability. Retailing for $349, the ProWriter Jr. is compatible with most popular personal computers. *For more information, contact C. Itoh Digital Products, Inc., 19750 South Vermont Avenue, Suite 220, Torrance, CA 90502, (213) 327-2110.*

DOWN ON THE FARM Based on a recently released survey, Farm Computer News has reported that, not only do most of their subscribers own their own computers, but nearly half of them plan to buy another one. The survey also indicated that the most common use for those computers is spreadsheets, with fully 80 percent of the respondents saying that was their primary function on the computer. The next most common use was word processing (76 percent). Apple took the biggest bite out of the ownership market with a 32 percent share. IBM holds a 25 percent share, but Radio Shack is still holding its own with 17 percent.

GREAT COCO III PRODUCTS

SECRETS REVEALED

An introduction to the Color Computer III !!! Compares differences between the CoCo I/II and the NEW CoCo III.

- GIME chip specs
- New Ext. Basic 2.0 cmds
- New Memory Map
- 128K Memory Tester

$14.95

C III GRAPHICS

It's here! A drawing program for the CoCo III using the new Enhanced graphic features. Requires 128K CoCo III w/Disk

- Uses 320x192 graphics
- 16 of any 64 colors
- Save & Load 32K screens
- Dual joystick button

$19.95

Buy 'em both for

$29.95

SUPER RAM -

THE FIRST 256K/512K MEMORY BOARD FOR THE CoCo II ! 256K/512K OF MEMORY RESIDES IN THIS STURDY, LOW NOISE METAL CASE AND ALL THE SUPPORT CIRCUITRY TO ACCESS IT AS A HIGH SPEED RAMDISK! COMPATIBLE WITH ALL CoCo II's, EVEN THE 26-3127B AND 26-3134A/B. (SEE JUNE '86 RAINBOW REVIEW) REQUIRES A RS MULTI-PAK.

256K BOARD - $129.95 512K BOARD (RECOMMENDED FOR OS-9 USERS) - $169.95
OS-9 DRIVER - $24.95

SUPER CONTROLLER -

THE MOST AMAZING CoCo DISK CONTROLLER EVER ! SWITCH UP TO FOUR DOS'S (UP TO 16K) VIA A SINGLE SOFTWARE POKE. CHOOSE BETWEEN R/S 1.0/1.1, SPECTRUM DOS, ADOS, JDOS STEARMAN DOS - $99.95 (SPECTRUM DOS $29.95 OR ADOS $39.95 WITH PURCHASE OF THE SUPER CONTROLLER - BUY 'EM BOTH FOR $59)

ENHANCED DISPLAY 80 - ADD AN 80X24 DISPLAY, REAL TIME CLOCK AND CENTRONICS PARALLEL PRINTER INTERFACE TO YOUR SUPER CONTROLLER ! INCLUDES SMOOTH SCROLLING, SWITCHABLE VIDEO INPUT - $149.95 (NEW OS-9 DRIVER FOR DISPLAY 80 - $24.95)

EPROM PROGRAMMER FOR THE SUPER CONTROLLER - $69.95 (USES 2764's ($4.95) OR 27128's ($6.95) EPROMS)

COMING SOON.....

COCO III 512K UPGRADE - ENHANCED COCO III DOS

All orders plus $3.00 S/H (Foreign $5.00) – COD add $2.00 extra – NYS Residents add Sales Tax

SPECTRUM PROJECTS
PO BOX 264
HOWARD BEACH NY 11414

COD ORDER HOT LINE 718-835-1344

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

SPECTRUM PROJECTS

SOFT AND HARD WARES FOR COLORFUL COMPUTING

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

COMMUNICATION

COLORCOM/E - A complete smart terminal package! Upload, Download, Hi-Res (51X24) screen, 300/1200 Baud, Offline Printing. 32/64K Disk* - $39.95
*- Now with DELPHI & Compuserve XMODEM support! Download ML!
COMPUSERVE Starter Kit $14.95

BUY CC/E Get COMPUSERVE Kit FREE!

WORD PROCESSING

TELEWRITER-64 - Three Hi-Res screens, true lowercase char's right justify, full screen editor. Tape $49.95 Disk $59.95
TELEPATCH - A TW-64 enhancer!!! True block move, Overstrike & TSPOOL mode, Type Ahead Buffer FASTER Disk I/O 64K Disk $19.95

BUY BOTH → SAVE $10

MODEMS

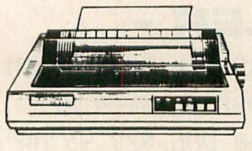
1200 BAUD
$129.95**

Hayes compatible! Super for the DELPHI & Compuserve CoCo Sig! 300/1200 Baud, Auto-dial/answer
** Requires Modem cable .$19.95

SEIKOSHA
SP-1000A

- 100 cps draft
- 20 cps NLQ
- Friction and tractor
- Front panel Controls
- 1.5 K buffer

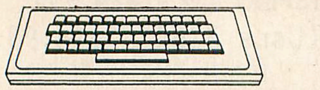
$219.95



PRINTERS

GEMINI NX-10 - 120 cps, tract-frict feed, NLQ mode, 5K buffer Front Panel Controls! - $249.95
KAMELEON -Low cost Parallel Ptr Interface! 600/9600 Baud $49.95
PBH-64 - A combo Parallel Ptr interface & 64K Print Buffer ! COMPUTE while you PRINT $149.95

KEYBOARDS



RS 26-3016 Low Profile CoCo Keybd. Fits all CoCoII's, "F" & TDP-100's WAS $39.95 NOW $19.95
Adapter for D/E CoCoI's - $9.95

Analog RGB
MONITOR
for CoCo III
$399.95#

Monitor Stand $24.95
#Dual RGB modes !!!

MONITORS

MONOCHROME MONITORS

80x24 Hi-Res screens! $89.95
Universal Video Driver - Works w/all monitors & CoCos!- $29.95
13" COLOR Monitors $169.95

SAVE $10 OFF COLORCOM/E WITH A HAYES MODEM
OFF TELEWRITER-64 WITH ANY PRINTER, KEYBOARD OR MONITOR **SAVE $10**

SPEEDY COD ORDER HOT LINE - CALL 718-835-1344

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

SPECTRUM PROJECTS

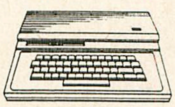
SOFT AND HARD WARES FOR COLORFUL COMPUTING

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

CoCo III IS HERE !!!

SPREADSHEET DATA BASE MANAGER

PRO-COLOR FILE - 60 Data Flds, 8 Report Fmts, 4 Screen Fmts, FAST ML Sort, Global Search, 1020 bytes/record - Disk $49.95
DYNACALC - Visicalc cmd format, 51x24 Screen, Hi-Res Graphics, New LOW price! 64K Disk $69.95
Buy'em *BOTH* for only $99.95



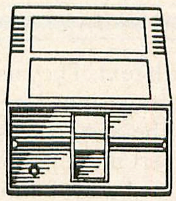
COCO MAX II

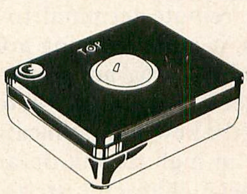
Feature packed Hardware and Software graphics system!!! Pull-Down menus, Multiple font styles, Full graphic editing, 256x192 Joystick input module.
64K Disk $79.95-w/Ycable $99.95
CoCoMax I-II Dsk Upgrade $19.95
MaxEdit-$19.95 MaxFonts-$64.95

DISK DRIVES

DOUBLE SIDED DRIVE 0 $239.95

Top FD-501 Drive 1 (#26-3131) — Easy install! (SAVE $60) $139.95





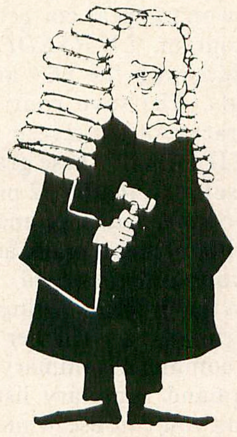
GAME CONTROLLERS

TRACKBALL $19.95*

Wico Command Adapter - Now you can hookup 2 Atari type joystks to your CoCo for only $19.95!
* Reg. $69.95 (See 9/86 review)

TANDY 1000

Want to upgrade your $699/$999 Tandy 1000 ? (See below ! ! !)
640K Upgrade - Take your 128K Tandy 1000 up to 640K and SAVE (Why pay up to $520 ?*) $169.95
Tandy 1000 2nd Drive - Add 360K of storage & SAVE MORE- $149.95
Buy 'em BOTH for only - $299.95



'You judge'

COCO II UPGRADES

Want to upgrade your new $69/$88 CoCo II? (See below !!)
4464 DRAMs - two chip 64K upgrade for 26-3134A and 26-3134B Korean CoCo II's ..$39.95
Extended BASIC - 28 pin ROM for 26-3134 A/B CoCo II's ...$34.95
Buy 'em BOTH for only - $69.95

* -Cost of RS Memory PLUS Expansion Board (25-1011) & 256K RAM kit (26-6019) 1986 Computer Catalogue - P.94

SPECTRUM PROJECTS, Inc.
PO BOX 264
HOWARD BEACH, NY 11414

CoCo Club/Dealer inquiries invited !
Software/Hardware submissions welcomed !
Looking for CoCo III software

All orders plus $3.00 S/H (Foreign $5.00) - COD add $2.00 extra - NYS Residents add Sales Tax

16K Disk

16K ECB Mod.

Use low resolution graphics to create sharp logon messages

Graphically Speaking: The Artistic BBS

By Eric Bailey

The world of telecommunications is expanding rapidly and the CoCo is growing with it. One of the things coming our way soon is telecommunicating with graphics. No one has produced a terminal program for the CoCo that can transfer high resolution graphics, yet. But low resolution graphics are possible through a modem.

I have tried to send graphics of the highest resolution for the CoCo, but it takes over five or 10 minutes for a simple picture. I have experimented to find a way to transfer the high resolution graphics, but have not found a way to make it easy to add to a BBS (Bulletin Board System). A new terminal program and BBS software would have to be written.

I decided to write a program that allows you to create and edit low resolution graphics. Then, if you have a BBS, you can use the data files to create logon messages.

Some bulletin board systems create graphics with text. They use the slashes, plus and minus signs, etc. The idea is good, and the systems using graphics seem to attract more people. I used this idea and added a little more.

Eric Bailey is a 14-year-old self-taught programmer from Urbana, Illinois. He has programmed on several of the Tandy computers and found the Color Computer to be his favorite.

For a remote terminal to see these graphics, it must be using a CoCo and the terminal program must show the character strings 128 through 255. Some of the new communications packages are in high resolution and do not show these character strings, so the graphics won't appear correctly.

My program, *LWRSEDIT*, creates the graphics with the `SET` and `RESET` commands. The save routine `PEEK`s each character of the screen and saves it in ASCII format. These graphics are in low resolution (64 by 32 pixels), but it is still possible to make some very nice pictures. Pictures can really add excitement to your bulletin board.

Type in the program listing and save it. When run, it asks whether you want to see a command summary or start. The command summary lists all the commands you can use while the program is running.

The program asks for a color. This color is just to start with; you may change it anytime while in the edit mode. It then asks for the name of the picture to edit. After these questions are answered, the screen turns black and there is a flashing cursor in the color you chose at the first prompt.

To move the cursor, use the four arrow keys. To make a dot the same color as the cursor, press the space bar. The color can be changed by pressing 'C'. When the cursor stops blinking, press the number of the color wanted. Use the colors listed in the main menu. These are the same as the values the CoCo uses in BASIC.

After the color has been changed, some problems may occur. When the cursor is moved over another color, the other colors flash on and off. This is to warn you that if you press the space bar (to make a dot), then all those blinking colors will change too. This is because the CoCo can only mix a color with black. This only happens in a block of four pixels. My advice is to carefully space your picture if you plan to use many colors.

For the text mode, press 'T'; the program offers text with your graphics. Use lowercase for the characters to mix with the background.

To save a picture, press 'S'. It uses the last name you used. To change the filename, use 'F'.

A SPECTRUM PROJECTS SHOPPING LIST

SUPER CHIP -SALE- ...

6821 Standard PIA ~~$9.95~~	$4.95
Basic ROM 1.1 Chip ~~$19.95~~	$7.95
6847 VDG Chip ~~$19.95~~	$9.95
6809E CPU Chip ~~$19.95~~	$9.95
27256 EPROM (Fits CoCoIII ROM)	$19.95
Orig SAM Chip (6883) ~~$29.95~~	$19.95
Basic ROM 1.3 (Newest version)	$19.95
68766 (Fits all Basic ROMS) EPROM	$19.95
Disk ROM 1.1 (Needed for CoCoIII)	$29.95
New SAM Chip w/heatsink (74LS785)	$29.95
Ext Basic 1.1 ROM - NEW LOW PRICE	$29.95
CoCo First Aid Kit - includes two PIA's, 6809E CPU & SAM Chips ~~$59.95~~	$39.95
EPROM Eraser - 3 min erasure time	$49.95
EPROM Prgmr - 2716's up to 27512 ! Super fast programming-See 4/86 review	$149.95

COCO LIBRARY...

A History of the CoCo / 1980-1986	$3.95
New! 200 MORE Pokes, Peeks 'N Execs	$9.95
Basic Programming Tricks Revealed	$14.95
CoCo Memory Map	$16.95
500 Pokes, Peeks 'N Execs	$16.95
Basic 09 Tour Guide	$19.95
Assembly Language Programming	$19.95
Color Basic Unraveled	$19.95
Extended Basic Unraveled	$19.95
Disk Basic (1.0/1.1) Unraveled	$19.95
New! CoCo II Service Manual*	$24.95
CoCo III Service Manual	$39.95
Official MICROWARE OS9 Manual Set	$49.95
The Complete Rainbow Guide to OS9	$19.95
W/Two Disk Package of demo pgms	$49.95
Color/Extended/Disk Basic Unraveled - Complete disassembly of the CoCo ROMS! Complete 3 Book Set - Save $10!	$49.95

MORE GOOD STUFF...

DELUXE JOYSTICK - Now only	$29.95
Computize "Y" Box - More positive connections than a "Y" Cable	$29.95
PBJ WORDPAK-RS - Newest version ! HiRes 80x24 display. Comes w/OS-9 drivr	$99.95
Micro Works DS-69A Digitizer	$149.95
512K Color Computer 3	$349.95

* - Specify CoCo II Catalogue Number

All orders plus $3.00 S/H (Foreign $5.00)
COD add $2.00 extra
NYS Residents add Sales Tax

COCO CABLES AND...

Printer/Modem 15' Extender Cable	$14.95
Tired of unplugging devices from your RS232 port? Try a RS232 "Y" Cable.	$19.95
Disk Drive Cable (34pin - 34pin)	$19.95
Modem Cable - 6ft (DB25-DB25)	$19.95
Joystick/Mouse 10' Ext Cable	$19.95
Dual Disk Drive Cable (3-34pin)	$24.95
Null Modem Cable - 4 pin to DB25	$24.95
15" Multi-Pak/Rom Pak Extender - Move your Multi/ROM Paks further away	$27.95
40 Pin Dual "Y" Cable - Hook up a Disk w/Voice, Word Pak, CoCo Max, etc	$29.95
Triple RS232 Switcher - Now select one of any three RS232 peripherals	$39.95
40 Pin Triple "Y" Cable - Hook up any 3- Voice/Word/RS232/Digitizer PAKs	$39.95
Special! 4 Drive Disk Cable	$49.95

OTHER GOOD STUFF...

C-10 tapes in any quantity	49 cents
5 1/4" Diskettes, any quantity	.79 cents
OS-9 Quick Reference Guide	$3.95
VHS T-120 Video Tapes	$7.95
Rompak w/Blank PC Brd-27xx series	$9.95
Video Clear - This cable will reduce TV interference created by CoCo!	$19.95
The Magic Box - Load Mod I/III Basic program tapes into the CoCo	$24.95
DOS Switcher - Select from any two DOSs (Disk 1.0 1.1, JDOS) in J&M ctlr	$29.95
Orig CoCoI "D" Rev motherboard. Includes all chips (SAM, CPU, PIA's, VDG) except RAM and Ext Basic ! Spare Parts !	$39.95
256K RAM Chips (Set of 8)	$39.95
Model 100 8K Upgrade	$39.95
HJL-57 Keyboard - Save $7.00!!!	$72.95
----- Specify Model/Revision Board -----	
HDS Controller w/1.1 ROM(SAVE$20)	$79.95
Amdek Drive System w/controller	$239.95

SPECTRUM PROJECTS
PO BOX 264
HOWARD BEACH NY 11414

COD ORDER HOT LINE
718-835-1344

SPECIAL 64K RAM CHIPS $19.95

⊕⊕⊕ COLORFUL UTILITIES ⊕⊕⊕

COCO CHECKER*

Something possibly wrong with your CoCo??? CoCo CHECKER is the answer!! Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-Pak Interface and more!! 16K TAPE/DISK **$21.95** (see Jan '85 Rainbow Review)

MULTI-PAK CRAK

Save ROMPAKs to your 64K Disk system using the RS Multi-Pak Interface. Eliminate constant plugging in of ROMPAKs now by keeping all your PAK software on disk. Includes POKEs for "PROBLEM" ROMPAKs- including the NEW 16K PAKS! (Demon Attack,Dragons Lair,etc) 64K DISK **$24.95**

NEW!

TELEPATCH II

All the FEATURES of TELEPATCH plus the classically proportioned characters of the WIZARD ($19.95) font w/TRUE lowercase descenders! Get BOTH & SUPERCHARGE your TW-64 for only **$29.95**

SPIT 'N IMAGE

A super upgrade from Disk Omni Clone! Back everything up! This amazing program handles "non standard" disks with ease. We haven't found any disk yet that it can't handle. Don't ever be caught without a backup again! Lowest price too! Beats most "copy protection" programs! 32K DISK **$29.95**

COCO SCREEN DUMP

The best screen dump program for the Panasonic, Epson & Gemini printers ever! Have the option of standard or reverse images w/regular or double sized proportional pictures. 600-9600 Baud too! A must for Graphicom and CoCo Calendar users. 16K TAPE/DISK **$21.95** (see Nov '84 Rainbow Review)

DISK UTILITY 2.1*

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename and kill file entries. Lightning fast Disk I/O for format, copy and backup. Examine contents of files, the Granule Table, plus the size, load addresses and entry points of all programs. Single command execution of both Basic and ML programs. 32K/64K DISK **$24.95** "Disk Utility has proven itself very quickly at my house" - Ed Ellers Oct '84 Rainbow Review pg. 220

SPECTRUM FONT GENERATOR

Now you can write files using any CoCo Word Processor (Telewriter-64, VIP Writer, etc.) and convert them to special Highly Detailed character sets! Some of the character sets supported are Italics, Old English, Futuristic and Block. A character set editor is included to create custom sets or modify existing ones! Supports most dot-matrix printers! DISK **$29.95** (see Dec '85 Rainbow Review)

SPECTRUM DOS

Add 24 NEW Disk commands with 2 Hi-Res screens! Supports 40 track & Double-Sided drives, 6 ms stepping, auto disk search, error trapping & "EPROMABLE". 64K DISK ~~$49.95~~ New LOW price!! **$24.95**

SCHEMATIC DRAFTING PROCESSOR

Save time and design pro looking diagrams using a 480X540 pixel worksheet w/6 viewing windows. Over 30 electronic symbols w/10 definable symbols. (Even Logic gates & Multipin chips!) Print hard copy and save to disk. 64K DISK ~~$49.95~~ New LOW price!!! **$29.95** (see Jan '84 Rainbow Review)

NEW!

THE MEMORY MANAGER

Now you can use the SECOND 32K memory bank of your 64K CoCo as a SUPERFAST Ramdisk! Also CHAIN a long Basic program from the first bank into the second or LOAD Basic programs into both 32K banks and RUN from either bank! USER FRIENDLY & completely MENU DRIVEN. 64K DISK **$29.95**

COCO CHECKBOOK

Use your CoCo to keep track of your checking and savings accounts! Printout individual personal checks! 32K/64K TAPE **$19.95** DISK **$29.95** (see April'85 pg. 210 & Oct'85 pg. 197 Rainbow Reviews)

NEW!

THE ULTIMATE GRAPHIC ADVENTURE

Wizard's Castle is a graphic adventure game with deadly creatures, magic spells and traps of all types which are RANDOMIZED at the beginning of each session so that no 2 adventures will be the same! REAL TIME ACTION keeps the game's characters interacting even though you may be waiting to make a move. Includes three skill levels, 60 Hi-Res screens & Game Save Feature. 64K DISK **$24.95**

BUY ANY 5 PROGRAMS
GET A DOUBLE SIDED
DRIVE 0 FOR $199.95
NO OTHER DISCOUNTS CAN BE APPLIED

*NOW AVAILABLE BY EXPRESS ORDER AT
YOUR LOCAL RADIO SHACK STORE!!!
ASK TO SEE THE RADIO SHACK
DEMO DISKS – FC#0249 & FC#0919!!!

⌖⌖⌖ COLORFUL UTILITIES ⌖⌖⌖

NEW!

GREETING CARD DESIGNER

Create custom greetings for any occasion: Birthdays, Anniversaries, Holidays, etc. The program can be used to make custom Thank-You, Invitations, Get-Well cards and Announcements! Easy to use and includes a library of pre-drawn Hi-Res graphics. Includes a screen & font editor. 32K DISK **$24.95**

COCO VIDEO TITLER

Start your VCR tapes with dazzling title frames followed by professional countdown to black fade-outs! Use a title page editor with several sizes of text & background colors! 32K DISK **$24.95**

PENPAL

It's here! CoCo's answer to 1-2-3! PENPAL combines Word Processing, Communications, Graphics, Data Base & Spread-sheet into a single integrated software package! 64K DISK INTRO PRICE **$69.95**

64K DISK UTILITY PACKAGE

Take advantage of an expanded 64K machine. Make an additional 8K of RAM available by relocating the Ext Basic ROM from $8000 to $D800. Copy ROMPAKS to disk (even "protected" PAKS) and create a 32K SPOOL buffer for printing. DISK **$24.95** (see July '83 Rainbow Review)

TAPE/DISK UTILITY

A powerful package that transfers tape to disk and disk to tape automatically. Does an automatic copy of an entire disk of programs to tape. Ideal for Rainbow On Tape to disk. Also copies tape to tape & prints tape & disk directories. TAPE/DISK **$24.95** (see Sept '83 Rainbow Review)

NEW!

SUPER DUPER UTILITIES

Finally! At last! A "SUPER DUPER" utility software package all rolled up into ONE!!! Includes such great utilities as: CoCo Disk Zap, Disk Encryption, Disk Mailing List, EZ Disk Master, Graphics ZOOM, Banner Creator, Function KEYS, Super INPUT/LINEINPUT, Basic Program PACKER, Alpha Directory, Basic SEARCH and much, much more!!! 32K DISK **$29.95** (see June '86 Rainbow Review)

COCO CALENDAR

Get organized for '86 TODAY with the CoCo Calendar! Designed for recording the entire year's occassions and daily appointments so you can plan ahead. You can store HUNDREDS of entries and our GRAPHIC Calendar will show all MEMOS! 32K DISK **$19.95** (see Mar '86 Rainbow Review)

THE OS-9 SOLUTION

NOW, a program that creates a "USER FRIENDLY" environment within OS-9! The OS-9 SOLUTION replaces 19 of the old "USER HOSTILE" commands with single keystroke, menu driven commands. No more typing in complex long pathnames or remembering complicated syntaxes! Set all XMODE parameters at the touch of keys! ~~$39.95~~ New LOW price!!! **$24.95** (see Sept '85 Rainbow Review)

COCO-UTIL

Now you can have the power to easily transfer Radio Shack Color Computer disk files to your MS-DOS machine - including the Tandy 1000 & IBM PC!!! You can also transfer MS-DOS files to your CoCo disk, even format CoCo disks! CoCo-Util will save you countless hours of retyping! No need to move your computer or printer anymore! Requires 128K MS-DOS computer w/2 disk drives - **$29.95**

NEW!

→→ SOFTWARE BONANZA PACKAGE ←←

Create an instant library of Spectrum Projects TOP Colorful Utility software. Select any of the following 12 programs to customize your own SPECTACULAR SOFTWARE BONANZA! CoCo Checker, Multi-Pak Crak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Fast Dupe II, 64K Disk Utility, Spectrum DOS, CoCo Calendar, Schematic Drafting Processor, OS-9 Solution, Basic Plus, EZ Base or Blackjack Royale (a $300 plus value) for only **$99.95**!!!

FRANK HOGG'S O-PAK

A Hi-Res Screen & Utilities package for OS-9 users! Use one of the available Hi-Res character sets (42X24, 64X19, 85X24, etc.) or create your own. Mix graphics with text on a screen with unlimited flexibility. Copy files between OS-9 and Radio Shack DOS. 64K DISK **$39.95**

All orders plus $3 S/H (Foreign $5)
COD add $2 extra
NYS Residents add Sales Tax
COD ORDER LINE 718-835-1344

SPECTRUM PROJECTS INC
PO BOX 264
HOWARD BEACH NY 11414

Finally, there is the load command; press 'L', which loads any picture already created, or it will load the first 512 characters of any data file in ASCII format.

Modifications

With a few modifications, you can change the program to work on a cassette system. Change the save and load routines starting at lines 360 and 420, respectively. Change each expression of `#1` to read `#-1`. Line 470 needs to be changed to a `REM` statement. It should not be removed, because it begins a subroutine.

The following listing is a short subroutine that can be inserted in a BBS to add graphics. Change the name of the data file to your needs. A short prompt added to the login of your BBS will tell if you should send graphics to them. The question could be, "Are you using a CoCo in 8-bit mode?" This ensures people with other computers won't receive garbage characters.

If the program does not work, try changing Line 40 to `40 PRINT CHR$(A);`.

```
10 OPEN "I",1, "TEST/DAT
20 FOR X = 1 TO 512
30 INPUT #1,A
40 POKE 1023 + X,A
50 NEXT X : CLOSE
```

(You may direct questions about this program to the author at 2016 Vawter #4, Urbana, IL 61801, 217-384-5083. Please enclose an SASE when writing.) □

```
150 ......204
410 .......84
580 ......140
END .....128
```

The listing: `LWRSEDIT`

```
10 ' LOW-RES GRAPHICS EDITOR
     COPYRIGHT 1986
     BY ERIC BAILEY
20 CLS:PRINTTAB(3)+STRING$(25,19
1)+STRING$(7," ")+CHR$(191)+"LOW
-RES GRAPHICS EDITOR"+CHR$(191)+
STRING$(7," ")+STRING$(25,191)
30 PRINTTAB(8)"BY ERIC BAILEY":P
RINT
40 INPUT"cOMMAND SUMMARY
           enter TO START
           COMMAND";Q$
50 IFQ$="C"ORC$="c"THENGOTO560
60 CLS:PRINT"CHOOSE COLOR
             1-GREEN         2-YEL
LOW          3-BLUE          4-RED
             5-BUFF          6-CYA
N            7-MAGENTA       8-ORA
NGE"
70 INPUT C:IFC<1ORC>8THENGOTO70
80 INPUT"WHAT IS THE NAME OF YOU
R PICTURE";F$
90 IF F$="" THENPRINT"YOU MUST C
HOOSE SOMETHING.":GOTO80
100 IFLEN(F$)>8THENPRINT"TOO LON
G. REDO":GOTO80
110 CLS(0):X=32:Y=16
120 A4=INT(Y/2):A5=INT(X/2):A6=(
A4*32)+A5:CP=PEEK(1024+A6)
130 FORT=1TO25:NEXTT:SET(X,Y,C):
FORT=1TO25:NEXTT:RESET(X,Y)
140 I$=INKEY$
150 GOSUB 540
160 IFI$=""THENGOTO120
170 IFI$="^"THENY=Y-1
180 IFI$=CHR$(12)THENCLS(0)
190 IFI$=CHR$(10)THENY=Y+1
200 IFI$=CHR$(9)THENX=X+1
210 IFI$=CHR$(8)THENX=X-1
220 IFI$="E"ORI$="e"THENGOSUB550
230 IFI$="Q"ORI$="q"THEN END
240 IFI$=" "THENGOSUB350
250 IFI$="S"ORI$="s"THENGOTO370
260 IFI$="L"ORI$="l"THENGOTO430
```

CANYON
COUNTY
DEVICES
P.O. BOX C
SAUGUS, CA. 91350

Voice Line
(818)904-1398

Data 300 Baud
(805)253-0221

Precision™
Mfg. by Xidex/Dysan
High Quality at low
cost DSDD 5¼" Disks
10 per box. $9.90bx

3-9	10 up
$9.20	$8.40

Generic DSDD 5¼" Disks.
68¢ each 30 for $18. $56. per box of 100.

Add $1.50 on orders less than $20.00.
Add $1.50 for CODs.
Calif. Sales Add 6.5% Tax.

DEALER INQUIRIES INVITED

PRINTER RIBBONS

Catalog#	Description	1 - 5	6 - 11	12 up
101-1505	C.Itoh Prowriter I&II (Nylon)	$ 5.05	$ 4.65	$ 4.35
101-2240	Epson LX80 (Nylon)	$ 5.95	$ 5.45	$ 5.15
101-2250	Epson MX/FX/RX 70/80 (Nylon)	$ 4.95	$ 4.55	$ 4.30
101-4505	Gemini 10/10X/15/15X (Nylon)	$ 2.20	$ 2.00	$ 1.90
101-4970	Gorella Banana (Nylon)	$ 6.60	$ 6.15	$ 5.95
101-4320	NEC Spinwriter 5500/7700(Nylon)	$ 5.50	$ 5.05	$ 4.75
101-4505	Okidata(Microline) 80/82/83/92/93(Ny)	$ 2.20	$ 2.00	$ 1.90
101-4515	Okidata(Microline) ML84 (Nylon)	$ 5.15	$ 4.70	$ 4.45
101-4700	Panasonic KX-P1090/91/92 (Nylon)	$11.15	$10.45	$10.10
101-4950	Radio Shack LP VI/VIII(Nylon)	$ 5.80	$ 5.30	$ 5.00
101-4970	Radio Shack LP VII (Nylon)	$ 6.60	$ 6.15	$ 5.95
101-4615	Silver Reed EXP 400/500/550/770(Ny)	$ 5.85	$ 5.20	$ 5.05
102-1505	C.Itoh Prowriter I&II/Apple Imagewriter Box of 5 colors (Red,Green,Yellow,Blue,Brown) $25.75box			
102-4505	Okidata 80/82/83/92/93 Box of 5 Colors Gemini 10/10X/15/15X (Red,Green,Yel,Blue,Brown) $12.50box			

Ribbons for most printers are available. Write for catalog or call on the Data Line. Quantity discounts available in larger quantities. OK to mix ribbons for quantity prices (Minimum 6 per Type).ALL GUARANTEED

```
270 IFI$="C"ORI$="c"THENGOSUB620
280 IFI$="T"ORI$="t"THENGOSUB660
290 IFI$="F"ORI$="f"THENGOSUB730
300 IFX<0THENX=0
310 IFX>63THENX=63
320 IFY<0THENY=0
330 IFY>31THENY=31
340 K=0:GOTO120
350 SET(X,Y,C):RETURN
360 'SAVE ROUTINE
370 GOSUB540:OPEN"O",#1,F$
380 FORQ=1024TO1535
390 W=PEEK(Q):PRINT#1,W
400 NEXTQ
410 CLOSE#1:GOTO120
420 'LOAD ROUTINE
430 CLS:LINEINPUT"FILE YOU WISH
TO LOAD (INCLUDE  EXTENSION) ";F
F$:IFFF$=""THENGOTO340
440 IFINSTR(1,FF$,"/")=0ANDINSTR
(1,FF$,".")=0THEN460
450 GOTO470
460 PRINT"MUST INCLUDE EXTENSION
":FORT=1TO1000:NEXTT:GOTO430
470 OPEN"D",#1,FF$:E=LOF(1):CLOS
E#1:IFE=0THENPRINT"FILE NOT FOUN
D":CLOSE#1:KILLFF$:FORT=1TO1000:
NEXTT:GOTO430
480 OPEN"I",#1,FF$
490 FORQ=1024TO1535
500 IFEOF(1)THENGOTO520
510 INPUT#1,W:POKE Q,W
520 NEXTQ:CLOSE#1
530 F$=FF$:X=1:Y=1:GOTO120
540 POKE (1024+A6),CP:K=0:RETURN
550 RESET(X,Y):RETURN
560 CLS 'COMMAND SUMMARY
570 PRINT"  UP ARROW - MOVE CURS
OR UP     DOWN ARROW - MOVE CURS
OR DOWN    RT. ARROW - MOVE CURS
OR RIGHT   LT. ARROW - MOVE CURS
OR LEFT          'S' - SAVE PICT
URE              'L' - LOAD PICT
URE              'E' - ERASE AT
CURSOR"
580 PRINT"             LOCATION
             <SPACE> - PUT DOT A
T CURSOR         'C' - PROMPTS C
OLOR                   CHANGE, H
IT 1-8           'T' - TEXT MODE
, STARTS               ABOVE CUR
SOR HIT                <ENTER> T
O LEAVE"
590 PRINT"       'Q' - QUIT
600 INPUT"PRESS <ENTER> TO START
";T$:RUN
610 'CHANGE COLOR
620 I$=INKEY$:IFI$=""THENGOTO620
630 D=VAL(I$):IFD<1ORD>8THENRETU
RN
640 C=D:GOTO120
650 'TEXT MODE
660 W=INT(Y/2):Z=INT(X/2):O=(W*3
2)+Z:O=O+1
670 IFO<1ORO>510THENRETURN
680 I$=INKEY$:IFI$=""THENGOTO680
690 IFI$=CHR$(13)THENRETURN
700 IFI$=CHR$(8)THENO=O-1:PRINT@
O," ";:GOTO680
710 PRINT@O,I$;:O=O+1
720 GOTO670
730 FOR XX=1024 TO 1056
740 Z=PEEK(XX):POKE 30000+XX,Z
750 NEXT XX
760 PRINT@0,"";:INPUT"FILENAME";
F$
770 IF LEN(F$)>8THENGOTO760
780 FOR XX=1024 TO 1056
790 Z=PEEK(30000+XX):POKE XX,Z
800 NEXT XX
810 RETURN
```

THE OTHER GUY'S Software

NEW FREE CATALOG

'KEEP-TRAK' General Ledger Reg. $69.95—ONLY $24.95

"Double-Entry" General Ledger Accounting System for home or business: 16k, 32k, 64k. User-friendly, menu-driven. Program features: balance sheet, income & expense statement (current & 'YTD'), journal, ledger, 899 accounts & 2350 entries on 32k & 64k (710 accounts & entries on 16k) (disk only). Version 1.2 has screen printouts. Rainbow Reviews 1.1 - 9/84 : 1.2-4/85

"OMEGA FILE" Reg. $69.95—ONLY $19.95

Filing data base. File any information with Omega File. Records can have up to 16 fields with 255 characters per field (4080 characters/record). Sort, match & print any field. User friendly menu driven. Manual included (32k/64k disk only).

Rainbow Review 3/85, Hot CoCo 10/85

BOB'S MAGIC GRAPHIC MACHINE

Can generate BASIC code to use in your programs. Easy drawing and manipulation of circles, elipses, boxes, lines and ARCS. Single joystick operation with on line HELPS at all times. Allows text on the graphics screen & movement of objects on the screen. Can be used as a stand-alone graphics editor. Instruction Manual. **GRAPHICS EDITOR.Reg. $39.95—ONLY $19.95** for disk or tape. 64k ECB.

Rainbow Review 7/85, Hot CoCo 9/85 "**The graphics bargain of the year**"

'KEEP-TRAK' Accounts Receivable. (Avail. 10/01/85).

Features: auto interest calculation, auto ageing of accounts, installment sales, total due sales, explanation space as long as you need, detailed statements, 'KEEP-TRAK' General Ledger tie in, account number checking, credit limit checking & more. User friendly/menu driven. Includes manual. **$39.95** or **$49.95** General Ledger & Accounts Receivables. (Disk Only).

'COCO WINDOWS' Available 10/31/85

With hi-res character display and window generator. Features an enhanced key board (klicks) and 10 programmable function keys. Allows the user to create multiple windows from basic. Includes menu driven printer setup and auto line numbering. Four function calculator. with memory. The above options can be called anytime while running or writing in BASIC. APPLE PULL YOUR DRAPES, YOU DON'T WANT TO SEE THIS. **$19.95** (disk or tape) includes manual.

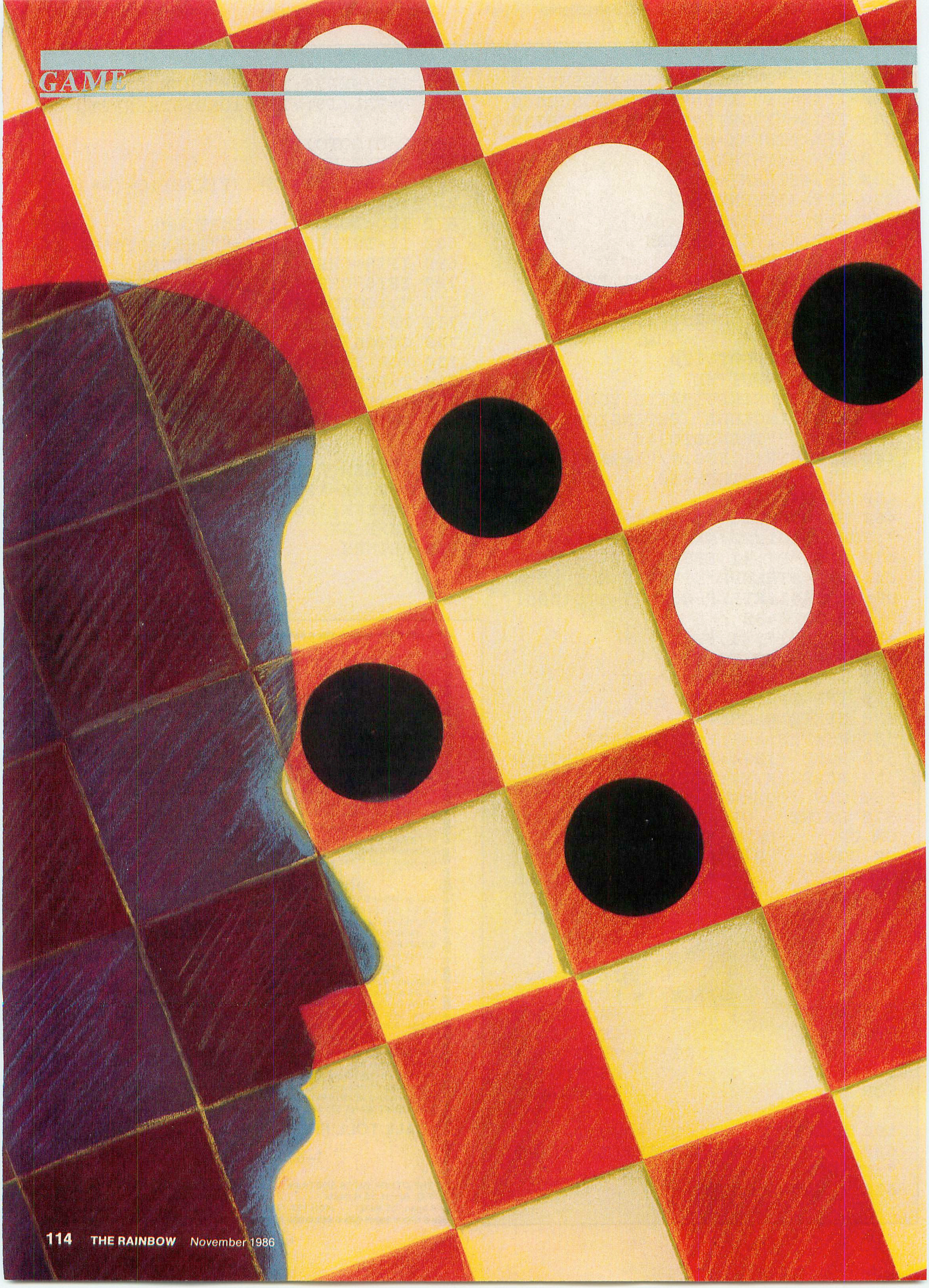
CALL TOLL FREE

1–800–942–9402

VISA MasterCard

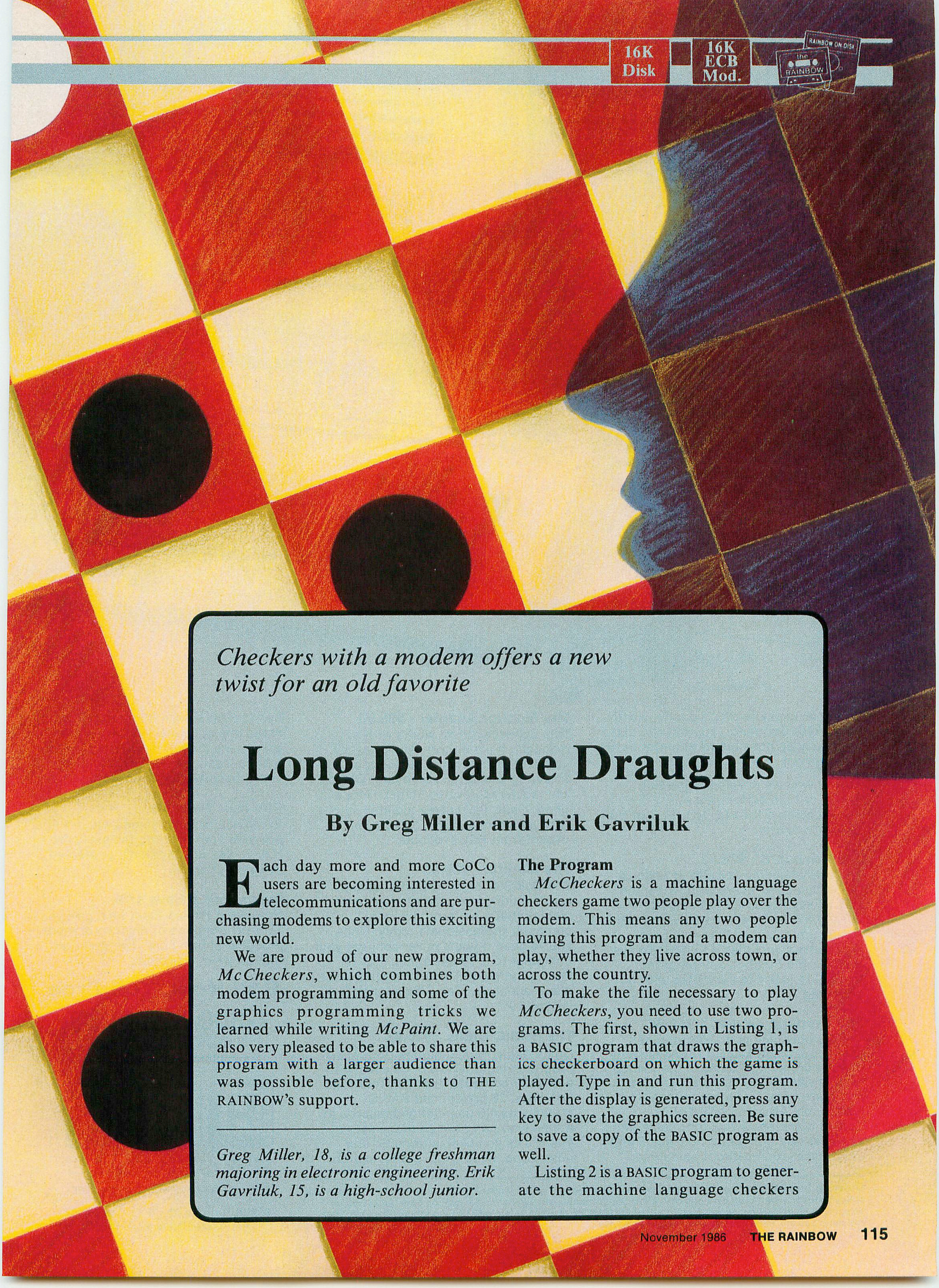
THE OTHER GUY'S SOFTware
P.O. Box H, 55 N. Main
Logan, UT 84321 (801) 753-7620

(Add $2.50 for postage & handling)
C.O.D., Money Order, Check in U.S. Funds
(Please specify if J&M controller)



16K Disk

16K ECB Mod.



Checkers with a modem offers a new twist for an old favorite

Long Distance Draughts

By Greg Miller and Erik Gavriluk

Each day more and more CoCo users are becoming interested in telecommunications and are purchasing modems to explore this exciting new world.

We are proud of our new program, *McCheckers*, which combines both modem programming and some of the graphics programming tricks we learned while writing *McPaint*. We are also very pleased to be able to share this program with a larger audience than was possible before, thanks to THE RAINBOW's support.

Greg Miller, 18, is a college freshman majoring in electronic engineering. Erik Gavriluk, 15, is a high-school junior.

The Program

McCheckers is a machine language checkers game two people play over the modem. This means any two people having this program and a modem can play, whether they live across town, or across the country.

To make the file necessary to play *McCheckers*, you need to use two programs. The first, shown in Listing 1, is a BASIC program that draws the graphics checkerboard on which the game is played. Type in and run this program. After the display is generated, press any key to save the graphics screen. Be sure to save a copy of the BASIC program as well.

Listing 2 is a BASIC program to generate the machine language checkers

The Ultimate Color Computer

Enhancements for Productivity from HJL Products

HJL
PRODUCTS
Div. of Touchstone Technology Inc.
12" MONOCHROME
GoldStar
Quick Basic Plus
USER'S GUIDE
NUMBERJACK
The HJL Numeric Keypad
F1 WITH LETTER CALLS THE BASIC COMMAND SHOWN.

To achieve maximum productivity with your Color Computer, you have to make it as easy as possible to get information into and out of the system.

This is why we developed the HJL family of high-performance enhancements for ALL MODELS of the Color Computer.

The Keyboard - $79.95
The overwhelming favorite of serious Color Computer users worldwide, the HJL-57 keyboard has the smooth, consistent feel and reliability you need for maximum speed with minimum input errors. Includes 4 Function Keys and sample function key program. Installs in just a few minutes with no soldering.

The Numeric Keypad - $89.95
The NumberJack is a self-contained, cable-connected keypad for heavy-duty number-crunchers. Besides the number keys, it has all the cursors, symbols and math keys, including autoshifted (one-touch) ADD and MULTIPLY. Comes complete with 3-foot cable and all necessary connectors for quick and easy installation without soldering.

The Monitor Adapter - $25.95
This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

The Monitor - $89.95
The GoldStar high-resolution amber monitor brings you the monochrome display that's preferred by most computer professionals today. Once you've used it you'll never connect your computer to a TV set again. The 12-inch diagonal CRT has an etched non-glare faceplate. (Requires adapter sold below)

The BASIC Utility - $25.95
Quick Basic Plus, a high-performance programming utility, can be used with any color computer that has four function keys. 26 pre-defined BASIC statements, 10 user-defined macros at a time (you can save as many sets of macros as you like), automatic line-numbering, word wrap, global search, and instant screen dump to printer, make this software the BASIC programmer's dream come true. Comes with re-legendable 3-way reference chart. Specify disk or cassette.

The HJL Warranty
Every HJL product comes with a full, one-year warranty and the exclusive HJL 15-day unconditional guarantee (except software).

Pick a Pair & Save 15%
Now, for a limited time, we'll give you 15% off the price of any two or more products shown here. Just mention this ad when you order.

Call Now, Toll Free

1-800-828-6968

In New York 1-800-462-4891
International calls: 716-235-8358

HJL
PRODUCTS
Div. of Touchstone Technology Inc.

955 Buffalo Road • P.O. Box 24954
Rochester, New York 14624

Ordering Information: Specify model (Original, F-version, or CoCo 2 Model Number). Payment by C.O.D., check, MasterCard, or Visa. Credit card customers include complete card number and expiration date. Add $2.00 for shipping, 3.50 to Canada; except monitors (call for shipping charges before ordering monitors). New York state residents add 7% sales tax. **Dealer Inquiries Invited**

game. If you get the Checksum Error message, check the data lines, because it is likely that one or more of them contain an error. Also be sure to save a copy before you run the program; an error in typing could crash the computer.

After running Listing 2, save the completed program on cassette by typing `CLOADM"CHEKBORD",&H800` and press ENTER. Then type `CSAVEM "CHECKERS",&HE00,&H3300,&H2600` and press ENTER. For disk, type `LOADM "CHEKBORD"` and press ENTER. Then type `SAVEM"CHECKERS",&HE00,&H3300,&H2600` and press ENTER.

How to Play

Load the game and type `EXEC`. You will see a banner, along with the prompt "Originate or Answer?" The person using the answer mode on his modem should use Answer; the other person should use Originate. The person using Originate goes first.

Next, you are put into the type mode, where you can send commands to your modem (if it responds to commands like a Hayes Smartmodem). If you have not already done so, you must now establish carrier between you and your opponent. Press BREAK to begin the game.

Both players move the white pieces on the bottom of the board. The program automatically displays the other player's pieces as black.

McCheckers is a complete implementation of checkers; the usual rules apply. Here's a brief overview:

- Pieces only move diagonally forward. A piece may be moved backward only if it is a king. A piece becomes a king when it reaches the last row of the opposing player (the top row on the screen).

- A piece must "jump" if at all possible. (This is an official rule of checkers, but is most often ignored in casual play.)

- The game ends when one player has captured all his opponent's pieces, or when a player has no possible move. If a player has no possible move, then the other player wins.

To move a piece, point the arrow to the piece you want to move, and then to the destination square. If you make an illegal move, you are told so. You can only move a piece when the arrow appears on the screen. If the arrow does not appear on your screen, it means that the other player is in the process of moving. You must wait for the arrow to appear before you can move. When it is your turn (the arrow appears on the screen), you may send a short message to the other player by pressing CLEAR and then typing your message. Messages are displayed on the top line of the screen. If you receive a message, press the joystick button after reading the message; the other player will not be able to continue his turn until after you have done so.

At the end of a game each player is notified as to whether he won or not, and is again put into the type mode, where pressing BREAK begins a new game.

(Questions about this program may be directed to the authors at 3101 Link Road #32, Lynchburg, VA 24503. Please enclose an SASE for a reply.)☐

240	242
490	207
590	128
END	155

Listing 1: `MCDRAW`

```
 1 ' BASIC PROGRAM TO DRAW
 2 ' CHECKERBOARD FOR McCheckers
 3 '
 10 PMODE 4,1:PCLS1:SCREEN 1,1
 20 DIM B(500),B2(500)
 30 FOR Y=0 TO 30 STEP 6
 40 LINE(0,Y)-(255,Y),PRESET
 50 LINE(0,Y+1)-(255,Y+1),PRESET
 60 NEXT Y
 70 X1=58:Y1=45:X2=195:Y2=180
 80 LINE(X1,Y1)-(X2,Y2),PRESET,B
 90 LINE(X1+1,Y1+1)-(X2-1,Y2-1),P
RESET,B
 100 LINE(62,48)-(191,177),PRESET
,BF
 110 GET (0,40)-(13,53),B
 120 FOR X=64 TO 190 STEP 32
 130 FOR Y=50 TO 160 STEP 32
 140 PUT (X,Y)-(X+13,Y+13),B,PSET
 150 NEXT Y,X
 160 FOR X=80 TO 176 STEP 32
 170 FOR Y=66 TO 176 STEP 32
 180 PUT(X,Y)-(X+13,Y+13),B,PSET
 190 NEXT Y,X
 200 FOR Y=32 TO 44
 210 IF Y/2=INT(Y/2) THEN A=204 E
LSE A=51
 220 LC=&HE00+Y*32
 230 FOR T=0 TO 31:POKE LC+T,A:NE
XT
 240 NEXT Y
 250 GET(0,33)-(255,44),B
 260 PUT(0,181)-(255,192),B
 270 GET(0,32)-(57,44),B,G
 280 GET(196,32)-(255,44),B2,G
 290 FOR Y=32 TO 180 STEP 12
 300 PUT(0,Y)-(57,Y+12),B,PSET
 310 PUT(196,Y)-(255,Y+12),B2,PSE
T
 320 NEXT Y
 330 FOR Y=4 TO 26
 340 LC=&HE00+Y*32
 350 FOR A=7 TO 24
 360 READ B:POKE LC+A,B:NEXT A
 370 NEXT Y
 380 A$=INKEY$:IF A$="" THEN 380
 390 CLS:PRINT"SAVING..."
 440 A=PEEK(&HC000)
 450 IF A=68 THEN SAVEM"CHEKBORD"
,&HE00,&H25FF,&HA027:END
 460 CSAVEM"CHEKBOARD",&H600,&H1D
FF,&HA027:END
 470 DATA 255,252,15,255,255,192,
24,31,255,255,255,255,255,255,25
5,255,255,255
 480 DATA 255,249,136,31,255,31,3
```

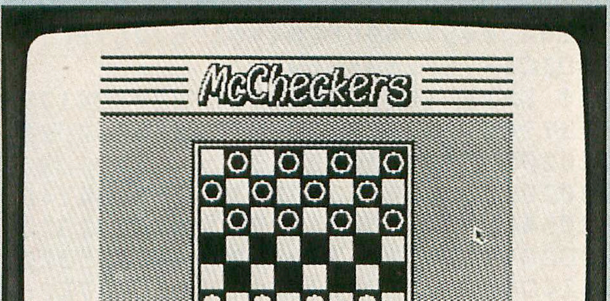
```
,31,255,255,255,255,255,255,255,
255,255,255
490 DATA 255,243,131,31,254,113,
134,31,255,255,255,192,255,255,2
55,255,255,255
500 DATA 255,247,135,31,252,192,
198,31,255,255,255,216,255,255,2
55,255,255,255
510 DATA 255,231,143,31,249,128,
204,31,255,255,255,152,255,255,2
55,255,255,255
520 DATA 255,237,155,24,3,0,204,
63,192,15,0,176,252,0,3,255,255,
255
530 DATA 255,205,155,3,195,5,140
,1,159,132,120,48,249,248,96,6,0
,127
540 DATA 255,217,179,14,102,12,1
2,240,48,193,204,48,243,12,55,19
2,252,63
550 DATA 255,153,179,24,54,28,25
,152,96,99,6,48,6,6,60,99,134,63
560 DATA 255,177,227,48,54,28,27
,12,96,102,6,96,198,6,56,6,6,63
570 DATA 255,49,230,48,102,63,21
9,12,192,198,12,97,140,12,48,12,
12,63
580 DATA 255,97,198,96,6,63,222,
12,195,140,0,103,12,56,48,12,0,6
3
590 DATA 255,97,198,97,6,63,222,
12,222,12,32,108,13,224,96,231,1
92,63
600 DATA 254,97,134,97,6,63,222,
13,240,12,32,120,31,0,97,224,120
,127
610 DATA 254,193,134,99,246,31,2
20,12,192,12,126,240,12,0,97,224
,12,63
620 DATA 254,192,12,99,243,28,28
,24,192,44,126,216,76,2,99,240,6
,63
630 DATA 252,192,12,98,3,1,156,2
4,192,12,64,204,12,0,195,224,6,6
3
640 DATA 253,132,12,96,193,195,2
4,24,192,204,24,198,12,12,195,23
6,6,63
650 DATA 253,135,236,49,128,126,
24,48,99,134,48,195,6,56,195,231
,12,63
660 DATA 253,135,224,31,0,0,24,4
8,62,3,224,193,131,224,199,225,2
48,63
670 DATA 252,15,224,0,4,0,0,128,
0,0,0,0,0,0,7,224,0,63
680 DATA 252,15,224,0,15,0,0,129
,0,0,0,0,0,0,7,240,0,127
690 DATA 252,15,255,192,31,255,1
92,129,128,56,2,4,8,2,7,252,0,25
5
```

201	**221**	**216**	**153**
205	**48**	**219**	**14**
208	**133**	**223**	**8**
212	**86**	**END**	**85**

Listing 2: MCLOAD

```
1 ' BASIC loader for McCheckers
2 '
3 GOTO 10
4 GOTO 20
10 CLEAR 1000:PCLEAR 8:GOTO 4
20 CLS:AD=&H2600
30 FOR T=29 TO 1 STEP -1
40 PRINT T;
50 READ A$
60 Z$=LEFT$(A$,2):A$=MID$(A$,3)
70 V=VAL("&H"+Z$):CK=CK+V
80 POKE AD,V
90 AD=AD+1:IF A$<>"" THEN 60
100 NEXT T
110 PRINT:PRINT
120 IF CK<>285767 THEN PRINT"CHE
CKSUM ERROR" ELSE PRINT"DATA COR
RECT"
130 END
200 DATA BDA9287F09867FFF408E2C1
6BDB99CBDA1765F814F2706814126F4C
6FFF72C16F72C06BDA9288634B7FF038
E2C6ABDB99CBD2B6D8635B7FF03B62C1
6B72C06BD2FC4C6408E2B7D108E2BBDA
680A7A05A26F9CC0000FD2C14BD29C7A
684260З3BD297FFC2C144C810826024F5
CFD2C14C10826E5BD
201 DATA 2B1A8E290FC60C3404EC81F
D2C144FBD295C6AE426F3C60CE7E4EC8
1FD2C14860lBD295C6AE426F23261732
C067D2C0610260O8D8601C603FD2C00B
D2A7F10270605BD2AB3102705FE7D315
82AFB7F3158B6315B8121260З7E2E25C
C0707B0315DF0315EFD2C14BD29C7A68
46F84B72C0FBD297F
202 DATA CC0707B0315FF03160FD2C1
4BD29C7B62C15810726058603B72C0FB
62C0FA7844ABD295CFC31614D102BFF8
A3406CC0707A0E0E0E0FD2C14BD29C76
F84BD297F7D3163102 7FF6F732C067E2
69ECC0204FD2C00BD2A7F1027059FBD2
AB31027059 8BD274F7E269E8E2764BF2
```

```
ECC8E2765BF2ECA8E
203 DATA 2DF1BF2FBC7E2EDD39FC2FB
AFD2C14BD29927D2C12102B0645FC2C1
2FD2C14FD2C0DFD2C07BD29C7A684102
706342BC381011027063081031027062
AB72C0FBF2C108E27A7BF2ECA7E2EDDF
C2FBAFD2C14BD29927D2C12102B0603B
E2C12BF2C14BF2C0BBD29C7A68410260
5FDFC2C07FD2C14BD
204 DATA 29C75FA6848104270 2C6FFF
72C027F2C0386FFB72C09B72C0AB62C0
7B02C0B4D2A01408101276F810210220
5BDB62C08B02C0C4D2A0140810210220
5ADB62C07B02C0BF62C08F02C0C2A087
D2C0227037E2DCA340686016DE42A028
6FFC6016D612A02C6FFEDE4B62C07A0E
0B72C14F62C08E0E0
205 DATA F72C15BD29C7A68481032 70
681011026056 46F84BD297FBE2C14BF2
C0986FFB72C03BD29D526077D2C03102
7055CB62C08B02C0C2A15FC2C07FD2C1
4BD29C7A68481012706810210230 53BF
C2C0B5D2616FC2C07FD2C14BD29C7A68
481032402 8B02A784B72C0FBE2C0BBF2
C14BE2C106F84BD29
206 DATA C7B62C0FA7844ABD295CFC2
C0DFD2C14BD297F7F290B7D2C032717F
C2C0BFD2C14CC0707FD2C04BD29EB260
6732C067329 0BBE2C07BF2905BE2C0BB
F2907BE2C09BF29098E2905C607BD2FC
B39000000000000000000000100030 00
50007000001020104010601010203020
50207020005020504
207 DATA 05060501060306050607060
00702070407060 78E1468F62C14583AB
62C1527B8308902004A26F9392E822E6
A2EB22E9A347634028DDD108E2954A6E
04810AEA6C60C3404ECA1ED843088206
AE426F5326135F634768DBC4FC60CA78
4A70130882 05A26F635F6FC2C1481402
52581C02421C13325
208 DATA 1DC1AF241980 40C03344444
444B72C124FC1102505C0104C20F7B72
```



THE RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

Back Issue Availability

Back copies of many issues of **THE RAINBOW** are still available.

All back issues sell for the single issue cover price. In addition, there is a $3.50 charge for the first issue, plus 50 cents for each additional issue for postage and handling if sent by United Parcel Service. There is a $5 charge for the first issue, plus a $1 charge for each additional issue on orders sent by U.S. Mail. UPS *will not* deliver to a post office box or to another country.

Issues July 1981 through June 1982 are available on white paper in a reprint form. All others are in regular magazine form. VISA, MasterCard and American Express accepted. Kentucky residents please add 5 percent state sales tax. In order to hold down costs, we do not bill and no C.O.D. orders are accepted.

Due to heavy demand, we suggest you order the back issues you want now while supplies last.

To order, just fill out the form on the next page and mail it with your payment to:

THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

For greater convenience, order RAINBOW Back Issues through the shopping area of the CoCo SIG of Delphi!

BACK ISSUE ORDER FORM

(See overleaf for instructions.)

(Payment must accompany back issue orders. We do not bill.)

☐ Please send me the following back issues:

NO.	MONTH YEAR		PRICE	
		VOLUME 1		
1	JULY '81	PREMIER ISSUE	$2.00	☐
2	AUG. '81		$2.00	☐
3	SEPT. '81	EDUCATION	$2.00	☐
4	OCT. '81	PRINTER	$2.00	☐
5	NOV. '81		$2.00	☐
6	DEC. '81	HOLIDAY	$2.00	☐
7	JAN. '82		$2.00	☐
8	FEB. '82		$2.00	☐
9	MAR. '82		$2.50	☐
10	APR. '82		$2.50	☐
12	JUNE '82		$2.50	☐
		VOLUME 2		
11	JUNE '83	PRINTERS	$2.95	☐
12	JULY '83	ANNIVERSARY	$2.95	☐
		VOLUME 3		
1	AUG. '83	GAMES	$2.95	☐
2	SEPT. '83	EDUCATION	$2.95	☐
3	OCT. '83	GRAPHICS	$3.95	☐
4	NOV. '83	DATA COMM.	$3.95	☐
5	DEC. '83	HOLIDAY	$3.95	☐
8	MAR. '84	BUSINESS	$3.95	☐
9	APR. '84	GAMING	$3.95	☐
10	MAY. '84	PRINTER	$3.95	☐
11	JUNE '84	MUSIC	$3.95	☐
12	JULY '84	ANNIVERSARY	$3.95	☐
		VOLUME 4		
1	AUG. '84	GAMES	$3.95	☐
2	SEPT. '84	EDUCATION	$3.95	☐
3	OCT. '84	GRAPHICS	$3.95	☐
4	NOV. '84	DATA COMM.	$3.95	☐
5	DEC. '84	HOLIDAY	$3.95	☐
6	JAN. '85	BEGINNERS	$3.95	☐
7	FEB. '85	UTILITIES	$3.95	☐
8	MAR. '85	BUSINESS	$3.95	☐
9	APR. '85	SIMULATIONS	$3.95	☐
10	MAY '85	PRINTER	$3.95	☐
11	JUNE '85	MUSIC	$3.95	☐
12	JULY '85	ANNIVERSARY	$3.95	☐
		VOLUME 5		
1	AUG. '85	GAMES	$3.95	☐
2	SEPT. '85	EDUCATION	$3.95	☐
3	OCT. '85	GRAPHICS	$3.95	☐
4	NOV. '85	DATA COMM.	$3.95	☐
6	JAN. '86	BEGINNERS	$3.95	☐
7	FEB. '86	UTILITIES	$3.95	☐
8	MAR. '86	BUSINESS	$3.95	☐
9	APR. '86	HOME HELP	$3.95	☐
10	MAY '86	PRINTER	$3.95	☐
11	JUNE '86	MUSIC	$3.95	☐
12	JULY '86	ANNIVERSARY	$3.95	☐
		VOLUME 6		
1	AUG. '86	GAMES	$3.95	☐
2	SEPT. '86	EDUCATION	$3.95	☐
3	OCT. '86	GRAPHICS	$3.95	☐
4	NOV. '86	DATA COMM.	$3.95	☐

RAINBOW INDEX A complete index to our first three years, July 1981 through June 1984, is printed in its entirety in our July 1984 issue. Separately bound copies are also available. $2.50 ☐

Note: Our Fourth and Fifth Year Indexes, including RAINBOW ON TAPE indexes, are included in the July 1985 and 1986 issues, respectively.

TOTAL ____________

KY RESIDENTS ADD 5% ____________

U.S. MAIL CHARGE ____________
SHIPPING & HANDLING
U.P.S. CHARGE ____________

TOTAL AMOUNT ENCLOSED ____________

Name ____________________________

Address ____________________________

City ______________ **State** ______ **ZIP** ________

☐ **Payment Enclosed, or charge to my:**

☐ **VISA** ☐ **MC** ☐ **AE**

CARD # ____________________________

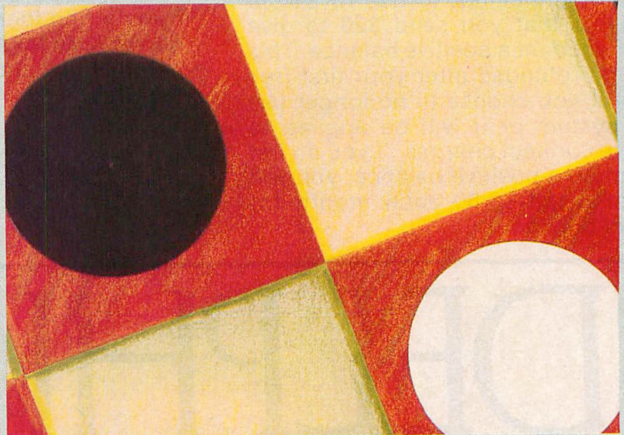
EXPIRATION DATE ____________ **PHONE #** ____________

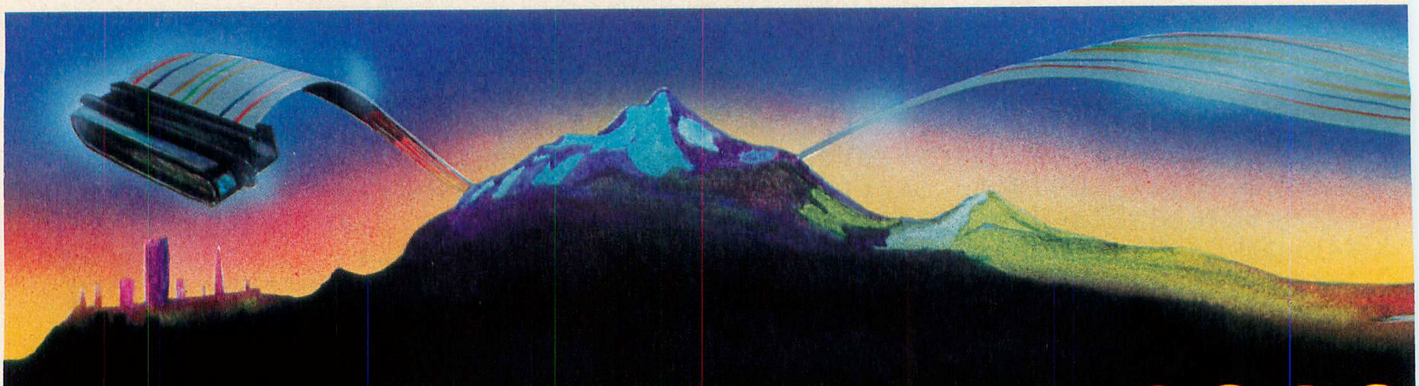
SIGNATURE ____________________________

To order by phone (*credit card orders only*) call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

```
C133986FFB72C12B72C1339F62C15585
858FB2C148E2BBD3A398E0000BF2C048
602B72C008604B72C01BD2B415D262BB
D29C7A684810325108GFFC6018D2C261
D8601C6018D242615860 1C6FF8D1C260
D86FFC6FF8D142605
209 DATA 20CF1CFB391A0439351 0BF2
C141A0439 0000FD2A24BE2C143410ABE
4810722E8B72C14EB61C10722DFF72C1
5BD29C7A684810127048103 26CF86027
D2A242A0286FEC6027D2A252A02C6FEA
BE4EB6181 0722B5C10722B1FD2C14BD2
9C7A684102 6FFA53510BF2C141CFB39C
C00003406ECE4FD2C
210 DATA 14BD29C7A684B12C00271BB
12C012716ECE44C8108250B4F5CC1082
50532621A0439EDE420D632621CFB39C
C0000FD2C04BD2B415D2658BD29C7FC2
C14FD2BFEA684B72BFD8102271A7A2C1
47C2C15BD29C7A68427367C2C147C2C1
4BD29C7A6842729B62BFD81012720FC2
BFEFD2C147A2C147A
211 DATA 2C15BD29C7A684270F7C2C1
47C2C14BD29C7A68427022 0A51CFB391
A0439B7FFC0B7FFC3B7FFC586FFB7FF2
28E0E003410 8EFFC686061F89686169E
459A7854A2AF4326239FC2C04FD2C144
C810826074F5CC10826013 9FD2C04BD2
9C7A68427E481FF27E0B12C002705B12
C0126D65F39AD9FA0
212 DATA 0027078103 27 05BD309E20F
139FF01FF01FF01FF0101FF01FF01FF0
1FFFF01FF01FF01FF0100FF00FF00FF0
0FFFF00FF00FF00FF0002FF02FF02FF0
2FFFF02FF02FF02FF0202FF02FF02FF0
2FF00000000000000000000000000000
00000000000000000000000000000000
00000000000000000
213 DATA 00000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
000000000000000002020202020202 02
04D63436865636B657273203 12E300D0
D42792047726567204D696C6C657220 6
16E642045726 96B20476176 72696C756
B0D3C4F3E72696769
214 DATA 6E61746520 6F722 03C413E6
E737765723F20000D2020202020202 02
0202 02D5459504520 4D4F44452D0D202
020202050524553532 03C425245414B3
E20544F2042454749 4E0D00202020202
02D2D594F552057494E20544849532 04
7414D452D2D0D008E2C9EBD2CEA7E262
6202020202 02D2D59
215 DATA 4F5520 4C4F534520544849 5
3204 7414D452D2D0D008E2CC3BD2CEA7
E26263410BDA9288E05009F88351 0BDB
99C3960606060606060606060494E564
14C49446 04D4F5645606 06060606060 6
```

```
0606060606060606060606604E4F60504
94543456054484552456060606060606
060606060606054
216 DATA 484154604953604E4F54605
94F55526050494543456060606060606
06060606043414E6754604D4F5645605
44F60544845524560606060606060604
F4E4C59604B494E47536043414E604D4
F5645604241434B57415244536060605
94F55604841564560416056414C49446
04A554D5060544F60
217 DATA 4D414B4560608E2CFA108E2
D1A108E2D3A108E2D5A108E2D7A108E2
D9ABD325D7E274F454E544552204D534
72C20333220434841525320 4D41582E0
D00B6FF00854027F9BDA9288E2DD6BDB
99CBDA3908E02DDC6217F02FEBD2FCBB
D2B1A7D31582AFB7F3158B6315D81062
6F17E2EDD007F2E24
218 DATA 8E315DC6207D2E242604A68
42607866 0B72E2420128160250480602
00A8140240681202502 8B40A7805A26D
98E315DBD325D8606B702DD8E02DDC60
2BD2FCB7E26A803001FE03FF03FF07FF
87FF87FF87FF83FF03FF01FE00300030
01FE030302010601840084008601820 1
030301FE003000300
219 DATA 1FE03FF03CF078787338733
878783CF03FF01FE0030003001FE0303
0231067984CC84CC86798231030301FE
0030000000000BE2F22BD2F47BD2FBE2
7FB6E9F2ECABD2FA3BD2F24BF2F22BD2
F61BD2FBE27E086FDB7FF02B6FF00844
02607BD2F476E9F2FBCBD2FA3BD2F24B
C2F2227DD3410BE2F
220 DATA 22BD2F47AD9F2ECC3510BF2
F22BD2F6120C70000F62FBBC1B62505C
6B6F72FBB8E0E00F62FBA5454543AF62
FBB2601393088205A26F739C609108E2
F58A6A0A7843088205A26F6390000000
00000000000108E2F91341 0C609CE2F5
8A684A7C0A6A0A484A7843088205A26F
035101 08E2F9AC609
221 DATA A6A0A884A7843088205A26F
4399F8F878381838180F060504844424
452790FAD9FA00AB6015AC6043DF72FB
AB6015BC6033DF72FBB39000000000B6F
F008401398E30C7BF010D3934771A501
08E304E10BF31598600B7FF20B6FF228
50126F98602B7FF20B6FF22850127F91
08E00003414A68031
222 DATA A65A26F93420C63C5A26FDA
662BD309EE662AE63A680BD309E5A26F
8A6E4BD309EA661BD309E8602B7FF20C
60AF73155BD3055C602F73155B731568
1151027FFC532653577B6315681061 02
6FF855F5A26FDBD309E393265357 77E2
FCB34751A508608B73157F631558E000
0B6FF224424 0F301F
223 DATA 26F65A26F3357532626E9F3
1595F8D168D10B6FF2244567A315726F
41F988D0235F58D008D003402B6315C2
1FE4A26FB358234771A5034024FB7FF2
08DE4C60864E425024F8C8602B7FF208
DD55A26F0326186 02B7FF208DC935F7B
6FF02B6FF224424013B8E314DBF31598
600B7FF20B6FF2244
224 DATA 24FA8602B7FF20BD3055B73
15B1F898E315DBD3055A7805A26F8860
2B7FF20BD3055B73156BD3055F631561
E89FD31538E315DF6315B108E0000A68
031A65A26F910BC3153261F8606BD309
EC605F73155BD3055C602F731557F315
881062 60D86FFB731583B8615BD309E2
09A8602B7FF203B00
225 DATA 00020000000000005900000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000
226 DATA 00000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000
227 DATA 00000000000000000000000
00000000000000000000000000000000
00000000000B6FF00850127F98636B7F
F03B7FF01B7FFC3B7FFC586FFB7FF22B
D32938634B7FF014CB7FF03B6FF02B6F
F001CAFB6FF00850127F939C620108E0
E00A680A7A05A26F91A50B6FF0084012
60BC6208E0E006F80
228 DATA 5A26FB39B6FF027DFF032AF
BB7FFC2B7FFC47FFF22C631B6FF007DF
F012AFB34763576125A26F0B7FFC3B7F
FC586FFB7FF227E32A2FF000002600
```





WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our $31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you're online you can order, for only $29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* ($21.95) and a total of three hours of connect time ($21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

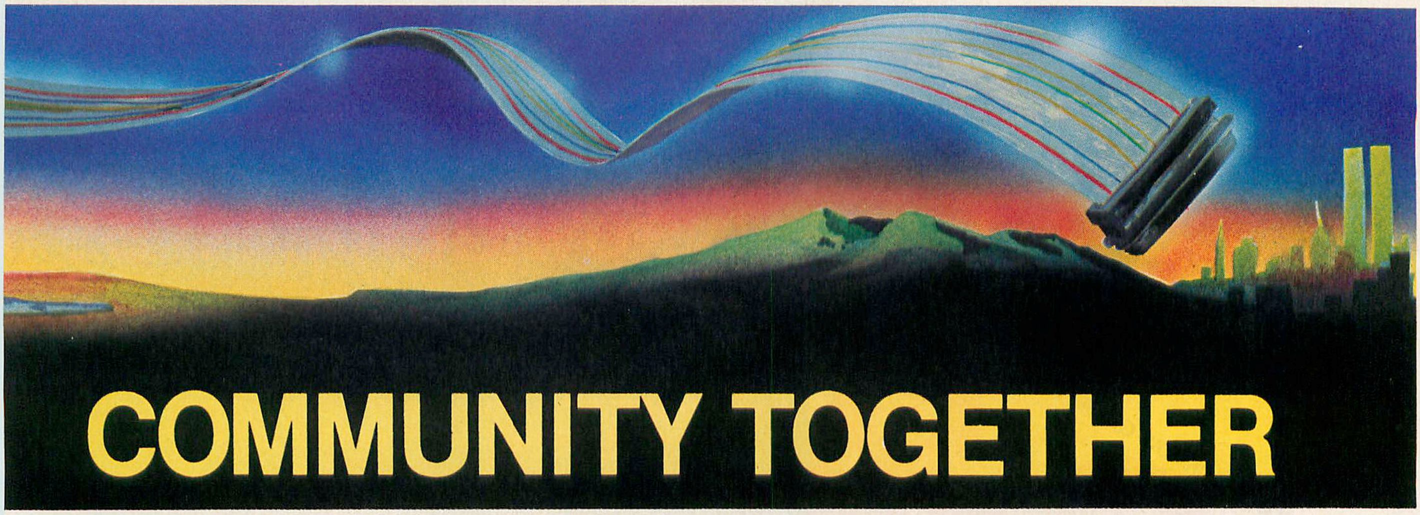
Problems? Call Delphi:

(800) 544-4005

(617) 491-3393

DELPHI TYPE:

GROUP COCO



How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Uninet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Uninet or Tymnet. Canadian residents using Datapac will be charged an additional $12 (U.S.) per hour.

On Uninet: Call (800) 821-5340 to get the Uninet number for your area. After you call the appropriate number for your own area and make connection, you'll see a prompt of "L?" Press ENTER, the period key (.) and ENTER again. At the "service:" prompt, type `GVC` (for General Videotex Corporation) and ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $12 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Uninet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Uninet, or 310600601500 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `RAINBOWSUB` and press ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `RAINBOWORDER` and press ENTER. At the "PASSWORD:" prompt, type `SENDSUB` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press `ENTER` and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is opened, *each RAINBOW subscriber will be credited with an hour of free time!*

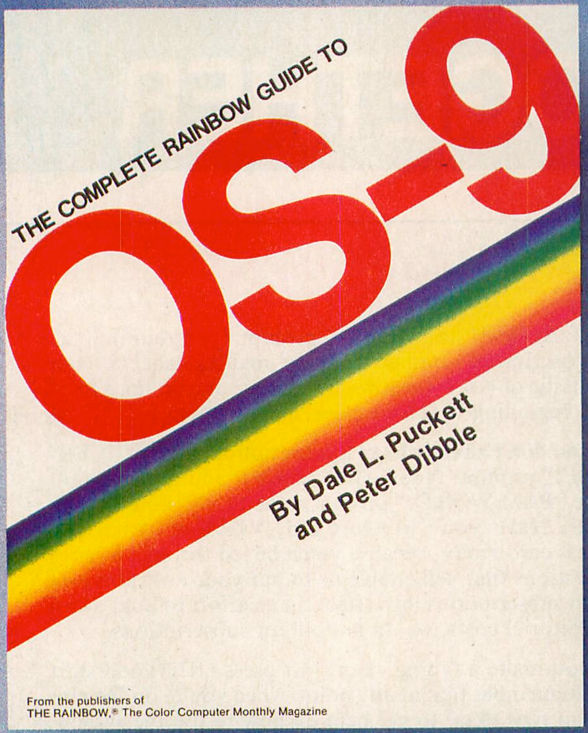
When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

More than a book . . .

A MILESTONE

THE COMPLETE RAINBOW GUIDE TO OS-9


THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble
From the publishers of THE RAINBOW,® The Color Computer Monthly Magazine

Today's programmers use short modules of readable code to build complex programs. The OS-9 operating system and the high level languages it brings you make the job easy.

OS-9 has so many things going for it that you need a guide as comprehensive and thorough as *The Complete Rainbow Guide To OS-9* to show you how to talk to OS-9 and realize the potential of this extremely efficient implementation of the UNIX operating philosophy.

Co-authored by Dale L. Puckett and Peter Dibble — two of the foremost authorities on OS-9 — *The Complete Rainbow Guide to OS-9* demystifies the dynamic operating system that gives the Color Computer more power and flexibility than many of the high-cost computers on the market . . . and gives you the ability and confidence to reach new programming heights.

With *The Complete Rainbow Guide To OS-9*, you will be prepared to take full advantage of the multitasking system that is setting new standards for Color Computer programming. For only $19.95!

Also Available!

The Rainbow Guide To OS-9 Disk. An adjunct to and complement to the book. You'll want the book for the tutorials, and the package of two disks to save the many hours of typing in lengthy programs. Two-Disk Package, $31

☐ Please send me *The Complete Rainbow Guide To OS-9 for $19.95.**

☐ Please send me The Rainbow Guide To OS-9 Disk (a package of two disks) for $31.* Does not include book.

For greater convenience, The Complete Guide to OS-9 and disks can be ordered through the shopping area of the CoCo SIG of Delphi!

Name ______________________ Signature ______________________

Address ____

City ______________________ State __________ ZIP __________

☐ My check in the amount of __________ is enclosed.

☐ VISA ☐ MasterCard ☐ American Express

Account Number ______________________ Card Expiration Date ______

Mail to:

The Complete Rainbow Guide to OS-9, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

To order by phone (*credit card orders only*) call 800-847-0309, 8 a.m. to 5 p.m. EST.

For other inquiries call 502-228-4492.

*Add $1.50 per book shipping and handling in U.S. Outside U.S. add $4 per book. Allow 6-8 weeks for delivery. KY residents add 5% sales tax. In order to hold down costs, we do not bill. ALL ORDERS IN U.S. FUNDS.

OS-9 is a trademark of Microware Systems Corporation.

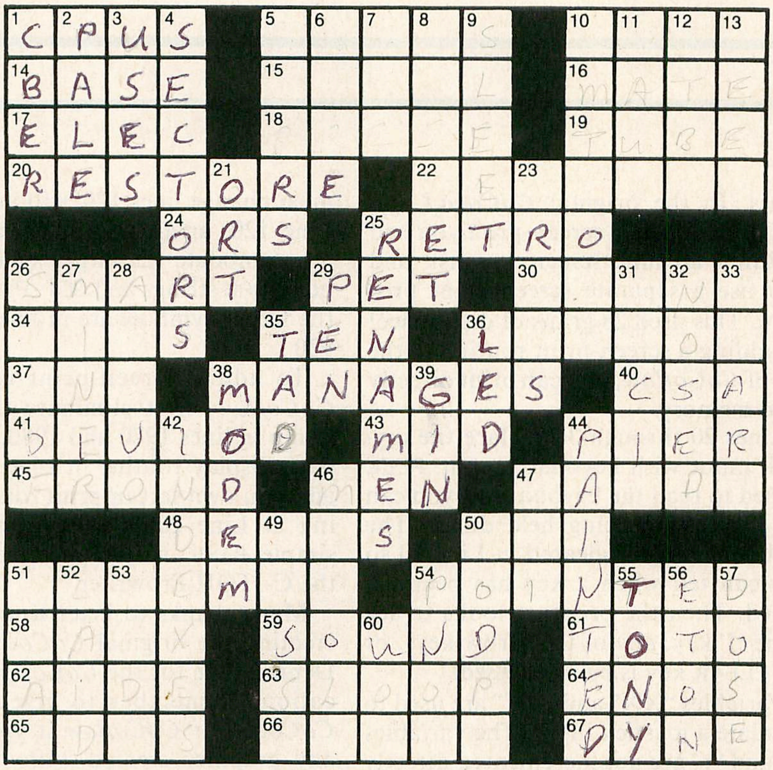
The Envelope Please

And the winner is Dick McGrath of Montreal, Quebec! Dick's entry in our Crossword Creator Contest was clever enough to win the judges over. For this winning acrostic, Dick will receive $25.

Sharpen your pencils and put on your thinking caps. For your entertainment we present Dick's puzzle and his tricky clues.

Good Luck!

By Dick McGrath



Across

~~1.~~ CoCo "hearts"
5. "First" competitors?
10. His CoCo is in the tent
~~14.~~ 2, 8, or 10
15. Business language
16. Desk -----
~~17.~~ CoCo power (abbr.)
18. Use <CLEAR>
19. Early memory core material
~~20.~~ Reset pointer
22. Characteristic
~~24.~~ Logical operators
~~25.~~ Reverse rocket
26. Modem type
~~29.~~ A cat, dog or CoCo
30. Disk divisions
34. Teaching acronym
~~35.~~ Decimal base
36. Time shares
37. Whole number (abbr.)
~~38.~~ Handles
40. Confederate States of America
41. "/" alternative
~~43.~~ String location
44. Dock
45. Palm leaf
46. Pac people
47. Yiddish Sarah (fam.)
48. Greek isle
50. Not Garfield, but -----
51. Warranted
54. Indicated in the stack
58. Elite or VIP
59. Motor or ----- on
61. OZ pooch
62. General assistant
63. Fore & aft rigged craft
64. ----- Slaughter
65. Triple helices
66. Avid CoCo age group
67. "Work force"

Down

~~1.~~ Pre-CoCo hacker
~~2.~~ Programmer's complexion
~~3.~~ Employs
~~4.~~ Parts of 30 across
5. Maples (species)
6. If not B or C try -----
7. Father, in Syria
8. Semi-conductor type
9. Freezing rain
10. Start anywhere (OS-9)
11. Oriental CoCo transport
12. ----- near
13. Louis' queen
~~21.~~ Table scrap
23. Greek guardian
~~25.~~ Changes title
26. Search a cassette
27. Mr. Dig
28. ----- blast
~~29.~~ ----- pal
31. Cast of characters
32. Snooted
33. Error trap?
35. Youngster
~~36.~~ Flashy diode
~~38.~~ Ma Bell connection
~~39.~~ Sloe ----- fizz
42. Back pages, usually
44. Colored an area
46. Component combination
47. Reagan's initiative
49. One of the significant bytes
50. Graphicom "gooof" fixer
51. Our own design aid (init.)
52. Reclined
53. "Dr." Alan -----
54. Pi-meson
~~55.~~ Mr. "Turn of the Screw"
56. English school
57. Measured amount
60. Bambi's mom

32K
Disk

Keycad/Keyflow: CoCocad and CoCoflow Modification

By James Ventling

This is a modification for those who don't always have a joystick or mouse handy to use with either the *CoCocad* (Oct. '85) or the *CoCoflow* (Mar. '86) programs. I wanted to use *CoCoflow* with some of my students but didn't have joysticks to go around. Instead, I changed the program to accept keyboard input. In place of the joystick, the arrow keys are used for cursor movement. The arrow keys may be held down for continuous movement or, for faster movement, hold the 'J' key (for jump) while using the arrows. The CLEAR key is used in place of the firebutton. When making a selection from the icons at the top of the screen, be sure to press the down arrow key until the cursor reappears or the option may de-select before you have a chance to use it.

While using *CoCoflow*, we found that the symbols for decision and connection were too small to place text information in. I made a further modification to increase the size of these shapes. We also dicovered that a screen-print utility could be added to *CoCoflow* due to its smaller memory requirements. In the original *CoCocad* and *CoCoflow*, to do a screen-print you had to dump all nine screens to disk and then use a separate screen print program. This used 28 grans of disk space! By adding a screen-print routine to the end of *CoCoflow*, you can print directly from memory.

Lines 20 through 30 replace the joystick input with keyboard input. PEEK is used to read the keyboard so you can tell if a key is being held down. The keyboard table is cleared in Line 20 so you can tell when a key has been released. Then the program looks to see if the 'J' key, any of the arrow keys, or the CLEAR key is being pressed.

Variables "XX" and "YY" are used to simulate a joystick input. The variables 'X' and 'Y' are not incremented directly because these variables are also used in some subroutines and could be changed when you least want it. Lines 29 and 30 check to make sure 'X' and 'Y' don't go out of bounds.

Line 121 starts the cursor at a convenient location at the top of the screen near the icon selection. You also have to keep the use of the CLEAR key from being misinterpreted as a keystroke when placing text on the screen. Changing Line 550 so as to ignore the CLEAR key takes care of this.

To change the size of the decision and connect symbols in *CoCoflow*, you must change lines 120, 910 and 930. Ir Line 120, array sizes are increased tc accommodate the larger symbols. The new DRAW strings and GET-PUT sizes foı the larger symbols are in lines 910 anc 930.

To add a screen-print routine tc *CoCoflow*, first eliminate the screen dump in lines 1970 and 1980. Keep the page-display routine in Line 1980 and add you own screen-print routine starting at Line 2000. I have included a simple BASIC screen-print routine foı the C-ITOH Prowriter.

Many thanks to Peter Kerckhoff foı creating the original *CoCocad* and to Dennis Page for the *CoCoflow* modification. Remember to give credit to *CoCocad* or *CoCoflow* if you publish any graphics created with these programs.

To make the modification for keyboard input, load Cococad or Cocoflow and type in Listing 1.

To make the modification for larger decision and connection symbols in *CoCoflow* type in Listing 2.

To add a screen-print routine, change lines 1970, 1980 and 1990. Add the screen-print routine at Line 2000. Don't forget Line 3000.

(You may direct your questions to the author at 2400 Cornwall Drive, Xenia, OH 45385, 513-376-2074. Please enclose an SASE when writing.)

James Ventling lives in Xenia, Ohio and teaches computers and art. He has two daughters and has been programming since 1981.

Editor's Note: The following program listings will be saved in ASCII on this month's RAINBOW ON DISK to facilitate merging with the original *CoCocad* and *CoCoflow* programs. To use from RAINBOW ON TAPE, you will first need to save the files to disk in ASCII format, then use the `MERGE` command. To use `MERGE`, load in the original *CoCocad* or *CoCoflow* listing and type `MERGE "filename"`. The filename refers to the ASCII save of either *CoCoMOD1*, *CoCoMOD2* or *CoCoMOD3*, depending on which modification is being used.

Listing 1: `COCOMOD1`

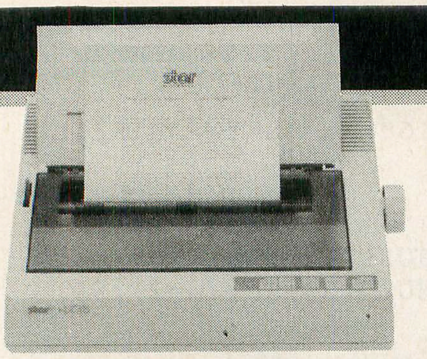
```
20 FORQZ=339TO344:POKEQZ,255:NEX
T:JK=PEEK(340)
21 IFPEEK(341)=247THENYY=YY-1:IF
JK=253THENYY=YY-7
22 IFPEEK(342)=247THENYY=YY+1:IF
YY<7THENYY=YY+12ELSEIFJK=253THEN
YY=YY+7
23 IFPEEK(343)=247THENXX=XX-1:IF
YY<6THENXX=XX-1ELSEIFJK=253THENX
X=XX-7
24 IFPEEK(344)=247THENXX=XX+1:IF
YY<6THENXX=XX+1ELSEIFJK=253THENX
X=XX+7
25 IFPEEK(339)=191THENP=3ELSEP=0
29 X=XX*4:IFX<3THENX=3:XX=1:ELSE
IFX>252THENX=252:XX=63
30 Y=YY*4:IFY<3THENY=3:YY=1:ELSE
IFY>188THENY=188:YY=47


121 XX=16:YY=9


550 GOSUB60:A$=INKEY$:GOSUB70:IF
A$=""THEN550ELSEIFASC(A$)=12THEN
550 ELSEPLAYB$:IFA$=CHR$(13)THEN
POKEAD(PG),255: AD(PG)=AD(PG)+1:
POKEAD(PG),0:GOSUB110: GOTO520
```

Listing 2: `COCOMOD2`

```
120 DIM C$(3),A(8),AD(8),C1(1),C
2(1),C3(1), L1(6),L2(6),L3(6),L4
(6),CM(45),CO(45),MD(255), MO(25
5):B$="V31L1004B":NF$="NONE"


910 DRAW"BD16M+24,-16M+24,+16M-2
4,+16M-24,-16":XW=48:YW=33:RETUR
N:'DECISION


930 DRAW"BD9U3EUE3RER3FRF3DFD3GD
G3LGL3HLH3UHU2":XW=17:YW=17:RETU
RN:'CONN
```

Listing 3: `COCOMOD3`

```
1970 '
1980 FOR PG=0 TO 8:PMODE4,1:SCRE
EN1,1:COLOR0,1:PCLS:GOSUB1790
1990 '
2000 'PUT YOUR SCREEN PRINT ROUT
INE HERE
2010 CLS:PRINT"GRAPHICS PRINT-OU
T FOR
PROWRITER":INPUT"READY PRINTER";
QQ
2020 PRINT:PRINT"WHAT SIZE PRINT
-OUT?":INPUT"1 OR 2";NN:IFNN<1 O
R NN>2THEN2020
2050 PRINT#-2,CHR$(27)CHR$(84)"1
6";:PMODE4,1:SCREEN1,1
2060 A1=3:A2=12:A3=48:A4=192:Z5=
0:ONNN GOTO2180,2210
2180 FORY5=0TO190STEP8:PRINT#-2,
CHR$(27)CHR$(83)"0256";:FORX5=0T
O255:P5=Z5:FORYY=0TO7
2190 IFPPOINT(X5,Y5+YY)<1THENP5=
P5+2yY
2200 NEXTYY:PRINT#-2,CHR$(P5);:N
EXT:PRINT#-2,CHR$(13);:NEXT:GOTO
3000
2210 FORY5=0TO188STEP4:PRINT#-2,
CHR$(27)CHR$(83)"0512";:FORX5=0T
O255:P5=Z5
2220 IFPPOINT(X5,Y5)<1THENP5=A1
2230 IFPPOINT(X5,Y5+1)<1THENP5=P
5+A2
2240 IFPPOINT(X5,Y5+2)<1THENP5=P
5+A3
2250 IFPPOINT(X5,Y5+3)<1THENP5=P
5+A4
2260 PRINT#-2,CHR$(P5)CHR$(P5);:
NEXT:PRINT#-2,CHR$(13);:NEXT:GOT
O3000
3000 NEXTPG
```



STAR NX-10 COMPLETE SYSTEM

Easy-to-use and ready for the heavy workloads from your TRS-80 Color Computer 1, 2, 3 or PC compatible. Control pitch, margins, NLQ, Italics and more from the Front Control Panel. Stuff the 5K data buffer with your own unique character set or use one of the 11 built in charater sets. 1 Year limited warranty serviceable nationwide. Deluxe Users manual. System includes the NX-10 Dot Matrix printer with BLUE STREAK II serial to parallel interface and our Software Trio (see below).

SPECS: 120cps Draft, 30cps NLQ, Italics Sub & Superscripts, Emphasized, Doublestrike, Proportional, International, Down Loadable Char., Left, Right, or Center Justification, Underline, Vertically Enlarged 2X/4X, 5, 6, 8.5, 10, 12, & 17 CPI, Graphics 480-1920 dots/line, Horz. & Vert. Tabs, Forward or Reverse n/216" Line Feeds, Hex Dump, Friction & Push Tractor, 5K Data Buffer.

$299^{95} +$10 Shipping and Insurance

COMPLETE

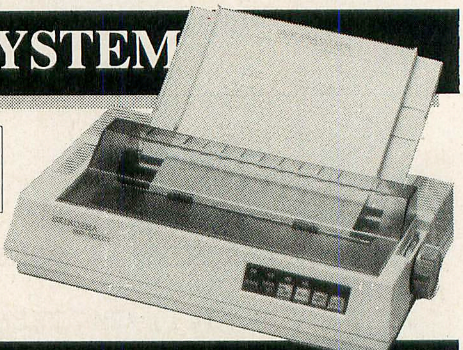
SEIKOSHA SP-1000A COMPLETE SYSTEM

Triple Mode Dot Matrix printer with serial interface, cable and our Software Trio (see below). Ready to run single sheet or 4" to 10" tractor paper from your TRS-80 Color Computer 1, 2, or 3. Compatible with your programs that let you control your baud rate, like CoCoMax, VIP, Basic and OS-9 etc. 24 month limited warranty. 76 page users manual.

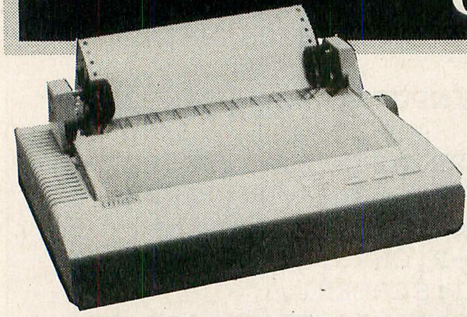
SPECS: 100cps Draft, 20 cps NLQ, Italics, Sub & Superscripts, Bold, Doublestrike, Proportional, International, Underline, 5, 6, 8.5, 10, 12, & 17 CPI, Graphics 480-1920 dots/line, Horizontal and Vertical Tabs, n/216" Line Feeds, Hex Dump, Friction and Tractor Paper Feed.

$219^{95} +$10 Shipping and Insurance

COMPLETE



CITIZEN 120D COMPLETE SYSTEM



Triple Mode, High perfomance Dot Matrix printer with serial interface, cable, and our Software Trio (see below). Ready to run with your TRS-80 Color Computer 1, 2, or 3. Load single sheets with one button ease or use the adjustable tractor with rear or bottom feed. Fill the 4K buffer with text and graphics from your favorite programs such as CoCoMax, VIP and Basic at rates up to 9600 baud. 18 month limited warranty. Deluxe users manual.

SPECS: 120 cps Draft, 25 cps NLQ, Italics, Sub & Superscripts, Emphasized, Doublestrike, Proportional, International, User Defined Characters, Left, Right, Center or Full Justification, Undrline, Overscore, Reverse Print, Vertically Enlarged 2X, 5, 6, 8.5, 10, 12, 17, & 20 CPI, Graphics 480-1920 dots/line, Horz. and Vert. Relative & Absolute Tabs, n/216" Line Feeds, Hex Dump, Friction and Tractor, 4K Buffer.

$229^{95} +$10 Shipping and Insurance

COMPLETE

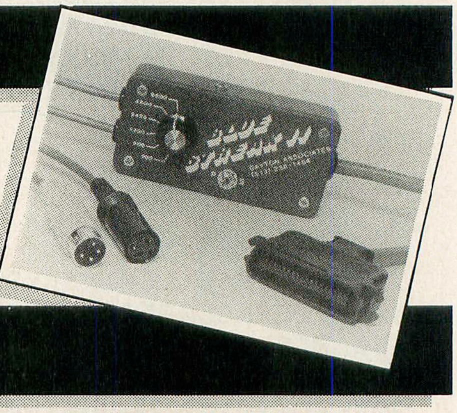
BLUE STREAK II Serial to Parallel Interface

Transfer your data from CoCo 1, 2, 3 to your parallel printer with a fury. The Blue Streak can increase your data transmission 4 fold over convetional-compatible interfacing and increase printer through put. An additional serial I/O port permits port sharing with another serial device without recabling.

SPECS: 300, 600, 1200, 2400, 4800, 9600 Swithcable Baud Rates, Power Supply 276-1431A UL Listed, 1 Year Warranty, Input 4 Pin Serial, Output 36 Pin Parallel and 4 Pin Serial, Total Cable Length 54 Inches, Box 4"x2"x1".

$49^{95} without power +$2 Shipping and Insurance

$54^{95} with power +$2 Shipping and Insurance



SOFTWARE TRIO

Dragon's WORD PROCESSOR 2.2

TAPE OR DISK VERSION

A feature packed program that turns your CoCo into an office machine. Create and save letters and documents with the Word processor tailored for your printer.

SUPER GEMPRINT

A FULL 8"X11" SCREEN DUMP PROGRAM

A well-written and documented program written in machine language position independent code. Features include user definable color shading and printing in all 5 Pmodes. Tape transferable to disk. Requires 16K extended color basic.

TYPE SELECTION TUTORIAL PROGRAM

Menu driven program for the CoCo. Teaches and shows the new user the numerous features of their printer. (Specify printer when ordering)

ALL THREE PROGRAMS **$19^{95}**

DAYTON ASSOCIATES of W.R. HALL, INC.

DUN & BRADSTREET LISTED
7201 CLAIRCREST BLDG. C
DAYTON, OHIO 45424
OHIO RESIDENTS ADD 6.5% SALES TAX • C.O.D. ADD $2.00

TRS-80 Color Computer® Tandy Corp., CoCoMax® Colorware Inc., VIP® Softlaw Corp. All data subject to change without notice.

AUTO•ORDER LINE
1-800-251 STAR
Personal Service
(513) 236-1454

RAINBOW REVIEWS

CoCo Util II
An Improved Way to Transfer Data/*Mark Data Products* 136

CoCoachiever
Organize Your Amway Business/*T&M Enterprises* 146

Code Practice
Improve Morse Code Skills/*Sunrise Software* 134

The Computer Phone Book
Learn About Computer Communications/*New American Library* 135

CyberTank
Simulation Requires Good Strategy/*Mark Data Products* 149

Digisector DS-69A
Produces Digitized Printouts of Video Pictures/*The Micro Works*........ 140

Dragon Blade
High Resolution Adventure Game/*Prickly-Pear Software* 150

Drive 1 Upgrade
Add a Second Disk Drive in Minutes/*Spectrum Projects, Inc.* 151

Flash Card Drill
Educational Program/*Thompson House* 148

LEO
Challenging Game Keeps You on Your Toes/*Lomiq Inc.* 145

LISTER
Structure BASIC Programs/*CMD Micro* 139

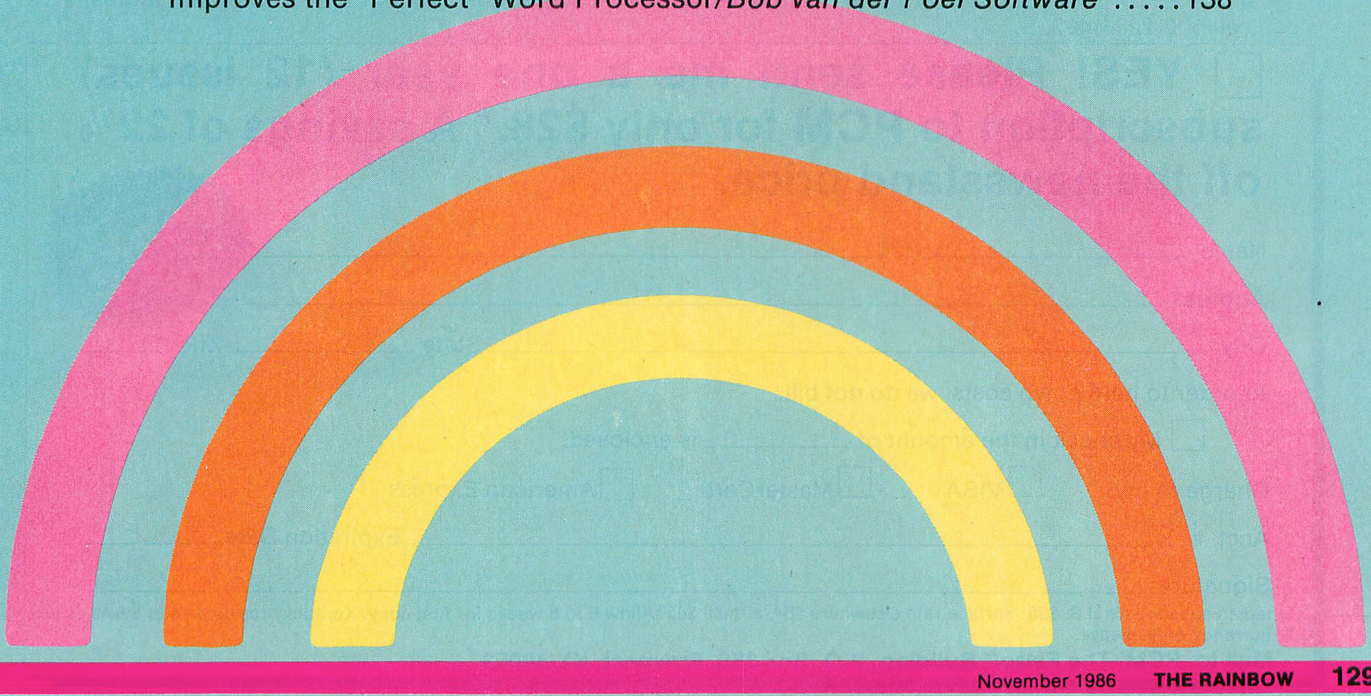
PBH-64 Print Buffer
Provides a Serial-to-Parallel Interface/*Spectrum Projects, Inc.* 144

Paper Route
64K Action Game/*Diecom Products* 147

Probaloto Version 2.0
Pick a Winner/*Gary Olander* 143

The Quest for Reality
Adventure Game with Magic and Mystery/*Brainbank Software* 150

Ultra Telepatch
Improves the "Perfect" Word Processor/*Bob van der Poel Software* 138



Now from Falsoft, The RAINBOW MAKER, comes . . .

The magazine for Tandy portable and MS-DOS users

Not only does Tandy produce our favorite CoCo, we think they produce the best and best-priced laptop portable and MS-DOS computers as well. We've found that when satisfied Color Computer users decide to add portability or move to MS-DOS, many stick with Tandy. For these people we publish PCM, The Personal Computer Magazine for Tandy Computer Users.

Each month in PCM, you'll find information and programs for the Tandy 100, 102, 200 and 600 portable computers. And you'll find even more coverage for their MS-DOS machines, the 1000, 1200, 2000 and 3000, along with the great new 1000 EX, 1000 SX and 3000 HL.

FREE PROGRAMS!

We learned from THE RAINBOW that readers want programs to type in, so each month we bring you an assortment of them: games, utilities, graphics, and home and business applications.

BAR CODE LISTINGS AND PROGRAM DISKS!

For portable users, PCM is the only home computer publication in the world that brings you programs in bar code, ready to scan into memory like magic with the sweep of a wand! For those who don't have time to type in listings, we offer a companion disk service with all the programs from the magazine.

TUTORIALS AND PRODUCT REVIEWS!

As if all this weren't enough, we offer regular tutorials on telecommunications and hardware; assembly language, BASIC and PASCAL programming tips; and in-depth reviews of the new software, peripherals and services as they are released. Add it all up and we think you'll find PCM to be the most informative and fun magazine for this market today!

To order by phone (*credit card orders only*) call 800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 502-228-4492.

☐ YES! Please send me a one year (12 issues) subscription to PCM for only $28.* A savings of 22% off the newsstand price.

For greater convenience, order a PCM Subscription through the shopping area of the CoCo SIG of Delphi!

Name ____________________

Address ____________________

City ____________________ State __________ ZIP __________

In order to hold down costs, we do not bill.

☐ My check in the amount of __________ is enclosed.

Charge to my: ☐ VISA ☐ MasterCard ☐ American Express

Acct. # ____________________ Expiration Date __________

Signature ____________________

*Canadian subscribers U.S. $35. Surface rate elsewhere $64, airmail $85. Allow 6 to 8 weeks for first copy. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.**

Mail to: PCM, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

REVIEWING REVIEWS

OS-9 Version 2.0.0

Editor:

I have been an avid reader of your magazine for well over a year now and consider it an indispensable part of my software library. Although I am not one to write to magazines very often, the review that I read on OS-9 Version 2.0.0 [September 1986, Page 146] has prompted me to write to you today.

In the review it states that it is not possible to make a bootable disk with the config program. This is simply not true. Insert a backed-up copy of the config disk into Drive 0 and type `chx /d0/cmds` and `chd /d0`. Then type `config` and follow the prompts. It eventually prompts you to insert a formatted disk into Drive 1 and installs the new boot file you have designed onto the disk. Then it allows you to install the CMDS and other directories if you want.

The config program allows you to put your own device descriptors and drivers into the selection process (at config run-time) by appending their names with .dd for device descriptor and .dr for device driver. It lets you put in your own file managers by the same process. I have done this with software for the J&R Banker RAMDisk.

The reviewer didn't mention that the Tandy version of OS-9 still hard codes the description of its floppy drive's disk step rate and number of sides into the CCDISK module. He also failed to mention that some third-party software will not work with Version 2.0.0. I had just purchased a 51-column software screen with various other utilities and was quite saddened to watch my screen "blow up" when I tried it with OS-9 Version 2.0.0 He didn't mention the park command, which is used just before the powering down of hard disks.

Thank you for the best Color Computer magazine in the world and keep up the good work!

Mark F. Sanderson
Houston, TX

OTERM

Editor:

I would like to pass on a compliment to Bernard Pluth, author of *OTERM*. This is a must terminal program for anyone interested in OS-9. After reading the manual, the first and only time, I was impressed with the ease of use of this program. The gentleman who reviewed it in the July 1986 issue of RAINBOW [Page 148] must not be familiar with OS-9. I, myself, have a long way to go with OS-9, but I found reading the manual only once was enough. Thanks, Bernie.

David Guess
Princeton, KY

Casper CoCo Quick Assembler

Editor:

The loading problem with the *Casper CoCo Quick Assembler* reviewed in the September RAINBOW [Page 137] was the `PCLEAR` bug. The older ROMs fail to update one of their pointers when they move the BASIC program. The `PCLEAR 1` fix I remembered from one of my old RAINBOWs was:

```
1 GOTO 999
2 (program)
9999 PCLEAR 1:RUN 2
```

Earl W. Casper
Phoenix, AZ

Memory Manager

Editor:

Thank you for reviewing our *Memory Manager* program [October 1986, Page 139]. I would like to comment on some of the statements that Mr. Church made.

First of all, he said, "The all-RAM mode allows approximately 8K of RAM for storage of a short program or data." He left out the important point that programs can be stored in the upper 8K of memory leaving all of the 32K of lower memory available for strings or data.

For saving programs Mr. Church stated, "Both BASIC and ML programs may be saved, but the beginning, ending and execution addresses must be known for ML programs." Can ML programs be saved to a floppy disk or tape without giving the beginning, ending and execution addresses?

A paragraph is devoted to explaining how inconvenient it is to have a program automatically run. It is much simpler to press the BREAK key to stop the program than to type `RUN` and press ENTER to start it. Most programs have a menu with options to be selected, and pressing the BREAK key stops the program.

Mr. Church also explains how inconvenient it is to save a copy of a development program to the RAMdisk with a disk or tape being preferred. The purpose of the RAMdisk is to quickly save programs. What could be faster than saving a copy of the development program in the RAMdisk and then running it? Also the *Memory Manager* program allows the first 32K memory bank to be copied into the second 32K bank. This can be used to save a copy of a development program.

I don't understand the implication that a program can lock up the RAMdisk. The RAMdisk occupies the upper 4K bytes of memory in the first 32K bank and stores programs in the second 32K bank. The lower 28K can be used for any program, although Mr. Church implied that complex programs will not run with the RAMdisk installed. Of course programs that use the memory reserved for the RAMdisk will not work.

Two programs included in the package are *RAMdisk* and *Memory Manager. RAMdisk* stores programs in the second memory bank. *Memory Manager* allows BASIC programs to be run in either of the 32K memory banks. Mr. Church states, "The two main purposes here are to use memory, either in two banks or an 8K block of memory for data or program storage." Programs up to 32K long can be placed in both banks. The 8K block is for the all-RAM mode where a program can be placed in the upper 8K of memory leaving the lower 32K for strings or data.

The last paragraph implies that only machine language programmers can benefit from the programs because of the quirks in the program. We have not received a single complaint from our customers and I am sure that most are not machine language programmers. If any problems do arise, we will gladly correct them.

Bill Chapple
Dynamic Electronics

Penpal

Editor:

I would like to bring a few items to your attention with regard to the review of *Penpal* [April 1986, Page 184].

When used on a CoCo 2, it intermittently prints a@a@a@a@a@a@ when 'a' is depressed or ihihihihihi when 'i' is depressed. This is very frustrating when using the WP package and prevents text where an 'a' is used in the spreadsheet. Four Star knows about this problem and says nothing can be done.

I originally purchased Version 1, then upgraded to Version 2. I phoned and wrote Four Star Software on many occasions. They told me that Version 2 was replaced by Version 2.1 and that they would send it to me. Since then they have repeatedly ignored my complaints.

If these problems could be resolved, I would have no complaints about this package of software. I feel it is disgusting the way that Four Star treats customers. I originally complained well within the 30 day warranty period (after proving the problem was not on my system). A classic case of the buyer beware.

Graham Langford
Pickering, Ontario

We welcome letters to "Reviewing Reviews" and remind you that they may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

RECEIVED AND CERTIFIED

The following products have recently been received by THE RAINBOW, *examined by our magazine staff and approved for the* Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

This month the Seal of Certification *has been issued to:*

Battle Hymn — the battle of Gettysburg, a 64K ML game with Hi-Res graphics. Recreate the Battle of Gettysburg from the absence of J.E.B. Stuart to Pickett's charge; from Johnson and Early's failure at Culp's Hill to Hood's victory at Devil's Den; from the attack at Big Round Top to McLaw's run at Peach Orchard. Take charge of 11 Confederate divisions and maneuver your forces against the Union line. *Ark Royal Games, Box 14806, Jacksonville, FL 32238, $29 plus $2 S/H.*

B.E.S.T. Expert System Toolkit, 64K artificial intelligence program. This menu-driven approach lets you generate your own rule-based backward chaining expert system. After answering a series of questions, a graph of the responses and correct solutions is displayed. *Thinking Software, 46-16 65th Place, Woodside, NY 13377, $79.95.*

CK.BAS, a copy/kill program that copies any number of files with any number of tracks up to 80, and kills any or all files on the source drive. Includes T40 and T80 (64K) ML programs that support up to four drives and supports all versions of Radio Shack ROMs. *CoCosoft, 1159 East 9th Avenue, Mesa, AZ 85204, $34.95.*

CoCo Hymnal, a collection of 40 hymns for the Color Computer. Each of five menus offers a choice of eight hymns. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, disk $9.95 plus $2 S/H.*

The CoCo Hymnal II, requires 64K and disk drive. This program contains 29 hymns arranged in four voices. Four different menus allow the selection of the hymns. While the music plays, words to the verses of each song are also displayed on the Hi-Res screen. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, $9.95 plus $2 S/H.*

DDAY, a 64K Hi-Res machine language wargame. Use your historical knowledge of the Allied invasion of France in a game of tactics and strategies. *Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, tape $23, disk $25. plus $2 S/H.*

Disk Programming Package, four utility programs for the Color Computer. *ADDML* appends machine language code to the end of BASIC programs; *UNPACKER* converts compressed BASIC program into single-line statements; *MLBASIC* converts BASIC programs into pseudo-machine language, which can be loaded and executed; *JOIN* links machine language modules and adds auto-execute. *CMD Micro Computer Services Ltd., 10447 124th Street, Edmonton, Alberta, Canada T5N 1E1, Disk $14.95 plus $2 S/H.*

Drive 1 Upgrade, single-sided drive that mounts in RS Disk 0 cabinet. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414, $139.95 plus $3 S/H.*

Filesafe, 32K or 64K disk file encryption program with Radio Shack Disk BASIC 1.0, 1.1 or JDOS. The program encodes all types of standard Disk BASIC disk files with a user supplied password, and features fingerprint and encoding routine. *Emerald Island Software, P.O. Box 1126, Cleveland, OH 44111, $22 plus $2.50 S/H.*

FRED, a French electronic verb dictionary that runs on a 16K disk system. Use the program to look up verb forms of any infinitive typed in and display them on the screen. *David Compton, 252 N. Main Street, Suffield, CT 06078, disk $12.95 plus $3 S/H.*

Library of FORTH Routines and Utilities, a collection of professional-quality FORTH codes. This book includes routines which show how FORTH's command-building properties can be used to create almost any kind of application. *New American Library, 1633 Broadway, New York, NY 10019, $22.95; $31.95 Cnd.*

LYRA, an eight-voice music editor utilizing a complete point-and-click user interface. *Lyra* allows four-voice music output to the TV speaker, but supports eight voices when output is directed to Symphony 12 or to a MIDI synthesizer. *Speech Systems, 38 W. 255 Deerpath Road, Batavia, IL 60510, disk only, $54.95.*

McWord, a machine language word processor. Program is written in 6803 assembly language and requires MC-10 microcomputer with 20K RAM and cassette recorder. *Michael Fahy, RD #1, Box 480, Central City, PA 15926, $25.*

Music Libraries 400, 500, 600, 700, 800, for the Color Computer. Each volume contains over 100 four-voice transcriptions of favorite tunes. *Musica* or a knowledge of music is not required. *Speech Systems, 38 W. 255 Deerpath Road, Batavia, IL 60510, tape or disk, $29.95 each volume.*

PBH-64 Print Buffer, a printer buffer combining 64K RAM and a serial-to-parallel interface. Includes complete instructions. *Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414, $149.95 plus $3 S/H.*

Packer, a program compressor utility which strips BASIC programs of remarks, unnecessary spaces, colons, semicolons and `GOTO`s; deletes `LET` statements; and joins lines together. Each option can be executed individually or all six can be executed in one pass. *CMD Micro, 17435 57th Avenue, Edmonton, Alberta, Canada T6M 1E1, $14.95 plus $2 S/H.*

Picture Perfect, a 16K ECB graphics screen dump. The program is a combination of BASIC and machine language programs that allows you to print out full-page copies of graphics pictures on any dot-matrix printer that has bit image graphics capabilities. *Hawkes Research Services, 859 Stanford Avenue, Oakland, CA 94608, $25.*

Print 'n' Wear, specially treated transfer sheets (8½ by 11 inches) that enable the user to computer-design and print iron-ons with dot-matrix or thermal ribbon printers. Print 'n' Wear transfers require Koala Pad or any type of graphics program, hand iron and Print 'n' Wear paper. *Foto-Wear, Inc., 62 Herbert Drive, East Brunswick, NJ 08816, $8.95 for 4 Pak; $19.95 for 10 Pak.*

Smart Speller, a spelling checker program that searches and replaces common misspellings in OS-9 files. Works with any version of OS-9 and corrects files created with any OS-9 word processor. The disk includes a dictionary and menu-driven dictionary editor to allow altering and customizing of dictionary file and OS-9 assembly source code. *Spectacular Software, Box 363, Mansfield Center, CT 06250, $9.95.*

Studies in the Parables, a Color Computer 64K disk Bible study program. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, $9.95 plus $2.50 S/H.*

Underware Ribbon, lets you create iron-on transfers with your printer. These ribbons come in a variety of colors and can be used on a wide range of printers. (Prices depend on type of printer used.) *Diversions, Inc., 505 West Olive Avenue #520, Sunnyvale, CA 94087, black ribbons, $14.95 to $19.95; color ribbons, $16.95 to $21.95; ColorPens, $14.95.*

White Fire of Eternity, 64K graphics Adventure. The scenario places you in the village of Faernarn during the age of monsters and magic, the time of gods and loremasters. Your hunger for knowledge puts you at odds with the loremasters and you storm out of the village only to discover you have become lost in the Forbidden Wood. Your quest for knowledge of the White Fire begins. *Saguaro Software, 4137 E. Bermuda, Tucson, AZ 85712, Disk $24.95.*

Word Processor, 64K Disk Extended BASIC printer page editor. *Kolesar/BS, 7 Ladd Road, Westfield, PA 16950, $16.95 plus $2 S/H.*

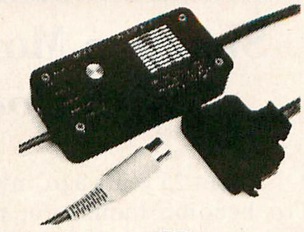
The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

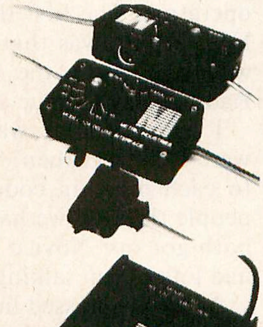
Metric Industries

Model 101 Interface $39.95



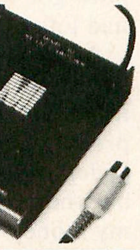
The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4″ × 2″ × 1″ and comes with all cables and connectors for your computer and printer.

The Model 104 Deluxe Interface $51.95



The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5″ × 2.5″ × 1.25″ and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Model 102 Switcher $35.95



The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

Cassette Label Package $15.95

Organize Your Tapes, Label Your Data Tapes, Color Code Your Tapes, Label Your Audio Tapes

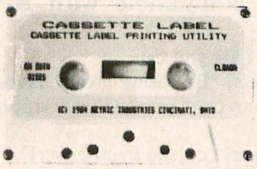
Save!

Save $8.40 when you purchase the Cassette Label program and label package. You get the Cassette Label program, 100 WHITE labels, 100 RED labels, 100 BLUE labels, 100 YELLOW labels, and 100 TAN labels. A value worth $24.35, but you pay only $15.95. When ordering, specify the Cassette Label PACKAGE.

Cassette Label Program $6.95

New Version 1.2-Tape transferrable to disk. Now save and load Labels from tape or disk.

This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, expanded or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.


CASSETTE LABEL
CASSETTE LABEL PRINTING UTILITY
(C) 1984 METRIC INDUSTRIES CINCINNATI, OHIO

Other Quality Items

High Quality 5 Screw Shell C-10 Cassette Tapes **$7.50 per dozen**

Hard Plastic Storage Boxes for Cassette Tapes **$2.50 per dozen**

Pin Feed Cassette Labels
White **$3.00 per 100**
Colors **$3.60 per 100** (Red, Blue, Yellow or Tan)

VISA MasterCard

THE 101, AND 104 REQUIRE POWER IN ORDER TO OPERATE. MOST PRINTERS CAN SUPPLY POWER TO YOUR INTERFACE. STAR, RADIO SHACK, AND OKIDATA ARE JUST A FEW THAT DO. EPSON DOES NOT. THE INTERFACES CAN ALSO BE POWERED BY AN AC ADAPTER (RADIO SHACK MODEL 273-1431 PLUGS INTO ALL MODELS). IF YOU REQUIRE A POWER SUPPLY, ADD A "P" TO THE MODEL NUMBER AND $5.00 TO THE PRICE. (MODEL 101P $44.95, MODEL 104P $56.95)

The Model 101, 102 and 104 will work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Ioth and many others. They support BASIC print commands, word processors and graphic commands.

We manufacture these products. Dealer inquiries are invited.

To order call our 24 hour order line 513-677-0796 and use your VISA MASTERCARD, request C.O.D. or send check or money order to:

Metric Industries
P.O. Box 42396
Cincinnati, OH 45242

Free shipping on orders over $50.00. Ohio residents add 5.5% sales tax.
Orders under $50.00 please add $2.50 for shipping.

Sharpen Morse Code Skills With *Code Practice*

About 25 years ago, my good friend, Steve, and I decided to become hams; no, not actors, but amateur radio operators. The first thing we found out about getting our FCC license was that we needed to learn Morse code. So we got ourselves the *Novice Bible* written by the Amateur Radio Relay League and read all about code.

I remember we walked around the neighborhood (we were teenagers then) "reading" store signs and street signs to each other in code — di-di-di-dit di-dit (hi). I'm sure people thought we had a few screws loose. Eventually, we both got our Novice licenses (five words per minute) and had lots of fun talking to other hams all over the world.

As we progressed in the hobby, our code speed gradually increased, but for me it was a struggle. Copying other hams' imperfect "fists" was not a very good way to become proficient (hams used to use mechanical hand keys to send code). There were some mechanical code machines to rent, but they cost several hundred dollars to buy. I needed all my money to purchase the radio equipment I needed to be a ham.

Now, however, for a mere $9.95 and your CoCo with a disk drive, you can purchase a program called *Code Practice* from Sunrise Software. This BASIC program, written by Brian Sokol (KA9SRK), is billed as being "written for those who would like to learn or improve their skills with the International Morse Code."

Typing `RUN "CODE"` starts the program. Short title and copyright screens appear before the first menu is shown. This menu gives you the choices of changing the speed at which you want the code sent (between two and 99 wpm), changing the tone of the code being sent, selecting the code practice mode and exiting. The first two options allow you to customize the program for your own personal preference.

The third option sends you to another menu. This menu gives you three choices: random characters, random QSO (a ham buzzword that means a conversation on the radio) and exit, which returns you to the first menu. The random characters are the alphabet, numbers and puncuation marks. There are 200 characters sent in groups of five. The random QSO is a typical first exchange that most hams use when first making a new "contact." It's almost in plain English, but does contain some ham buzzwords. At the end of either practice session, what has just been sent appears on the screen so you can see how well you're doing.

The disk is not copy protected but it is run protected. You have to plug the code plug, supplied with the program, into the right joystick connector for the program to run. This is a minor nuisance, but it's much nicer than being copy protected.

The manual consists of one and a half dot-matrix pages containing most of the information needed to run the program. Memory capability for the CoCo is not specified, nor is the range of code speeds permissible under the "change speed" selection.

The only thing I question about this program is whether you can really learn Morse code using it. There are no instructions for learning the code. It takes a bit more than an automatic sender to learn it. You need to be told how each character is represented in Morse code — the dots and dashes that define each character. None of this basic information is provided. You'll have to round up the old *Novice Bible*, if they still print it, or find someone to help you get started. (Just about any ham would be happy to help; you can find them by walking around the neighborhood looking for the 15 antennae on the roof.)

The program could be a great help in building your proficiency once you've learned the basics. As long as you realize this limitation, I would recommend this program to anybody, from the rank amateur (pun intended) to the guy like me who has forgotten a lot of dots and dashes.

So for now, 73 (best regards) ES (and) QRT (I have to sign off now) DE (from) K9AKC.

(Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322, $9.95 plus $2 S/H)

— C.L. Pilipauskas

Plan-Net Forms
P.O. Box 1061
Wilkes-Barre, PA. 18702

Introduces

Label Master

We are pleased to announce the addition of the **LABELMASTER** to our line.

The **LABELMASTER** is compatible with ANY printer that can print text!!!

With LABELMASTER you can:

- **Make customized diskette jackets! By using your favorite dump program, you may add your own personalized graphics design!**
- **Print jackets with the disk's directory, on the front cover!**
- **Print professional looking labels for your disks!**
- **Print Blank, or personally customized Cassette labels!**
- **Prepare and Maintain Mailing Labels! You may print an unlimited number of every label on the disk in one operation!**
- **Save Money!!! LABELMASTER'S DISK-TWIN will allow you to easily double the storage capacity of each diskette!**

ORDER NOW!

***Only* $19.95**

ALSO,
*** very high quality generic ssdd disks - $.85 each ***
NO QUANTITY LIMIT.

CREDIT CARD ORDERS, CALL (717) 821-2946

VISA MasterCard

PLEASE ADD $2.00 S&H. PA ORDERS ADD 6% SALES TAX

Learn About Computer Communications With *The Computer Phone Book*

Reaching out and touching someone over the telephone is easy — pick up the handset, dial the number and voila!, you're talking to the person on the other end. You don't have to be concerned about all the technology that resides between your phone and the person you're calling.

Unfortunately, the state of computer-to-computer communications has not reached the level of simplicity that phone-to-phone communications have. If one wants to get the most out of his computer by linking it with another computer, it is necessary to understand some basics of computer communications.

User documentation is often more of a hindrance than a help. Whoever writes these masterpieces of confusion assumes that you know all there is to know about the basics, so it's easy for a beginner to get lost.

Coming to the assistance of the computer owner who would like to learn the basics of computer communications is a book entitled *The Computer Phone Book*.

The Computer Phone Book is divided into two volumes. The first, *A Guide to Using Online Systems*, starts by explaining, in a well-organized, simple manner, what computer communications consist of. It includes what hardware and software are necessary, what features are required and desirable, and what you can expect to find at the other end of the line.

Although I've been online for over five years, I found the introduction section of the book very informative. The author, Mike Cane, explains complex concepts in a simple, understandable manner. Anyone looking for a detailed explanation of telecommunications, however, should look for another book. Only the basics are to be found here.

Book I is intimidating at first glance; it's 493 pages long. However, only the first 25 pages deal with the basics of computer telecommunications. The remainder of the book deals with the various services which can be accessed when one is online.

Before reviewing the book, I was unaware of some of these services and what they had to offer. I discovered that some of the financial information I gather through online systems can be retrieved at a lower cost using other services.

The Complete Phone Book, Book II, A Directory of Online Systems, resembles your standard phone book, in that it contains listings of the world's major electronic libraries. It includes an overview of available information, names, numbers, profiles of hundreds of systems large and small, special services, and overseas and Canadian systems.

This has to be the largest list of online systems available. *Book II* is 685 pages long, divided into sections covering United States National Systems, United States Local Systems, United States Bulletin Board Systems, Canadian Bulletin Board Systems and United States Special Services. Where appropriate, these sections are subdivided into geographic areas, making it easy to find systems which are accessible without paying for a long distance call. Each listing contains such information as telephone number, operating hours, costs (if any) and contacts, as well as frank commentary by the author.

While this is great information, it's only useful if it is accurate. Hopefully, the publisher will strive to keep the book current. Purchasers are invited to register for free updates. The first printing, June 1986 was very current at the time of this review. In my 303 area code there were 15 Bulletin Boards listed. I was aware of only three of these. The discovery of the additional 12 local boards alone would have justified the cost of the book.

If you are getting started in telecommunications, both volumes of the *Computer Phone Book* will be of use. Experienced onliners will find new friends through *Book II*.

(New American Library, P.O. Box 999, Bergenfield, NJ 07621, *The Computer Phone Book — Book I*, $14.95; *Book II*, $18.95)

— Bruce Rothermel

THE SOFTWARE HOUSE
A DIVISION OF DATAMATCH, INC.
DATAMATCH
"FLIPPYS"
DS/DD-2 NOTCHES-2 ID HOLES
10/$9.95 100/$95.00
DATAMATCH DISKETTES
SINGLE SIDE/DOUBLE DENSITY
10/$9.00 100/$85.00
PROGRAMMER'S DISKS
SS/DD 10/$8.00 100/$75.00
DS/DD 10/$9.00 100/$85.00
ALL DISKS COME WITH TYVEK SLEEVES, LABELS, W.P.TABS
HEAT TRANSFER (IRON-ON) RIBBONS
BLACK - RED - BLUE - YELLOW
GEMINI/OKI PRINTERS $5.95 EA.
COLOR RIBBONS: Red, Green, Blue, Brown
GEM/OKI 4/$10.00
EPSON 4/$24.00
APPLE/NEC 4/$24.00
ALL ITEMS 100% GUARANTEED!
Add $2.50 S/H in U.S.A - Canada Add $3.50
Michigan Residents Add 4% Sales Tax
Send check or money order payable to:
THE SOFTWARE HOUSE
9020 Hemingway, Redford, MI 48239
(313) 937-3442
VISA Send Card Number and Exp. Date MasterCard
Min. Charge Order $20.00

Software Review

CoCo-Util II: An Improved Way to Transfer Data

There is good news for those of you who need to transfer data between the Color Computer and an MS-DOS machine. Mark Data has released a sequel to its powerful programming utility, *CoCo-Util*.

CoCo-Util II provides the capability to migrate disk files from one system to the other. It requires an IBM/PC or compatible, 128K RAM, two floppy disk drives or a floppy and a hard drive and PC/MS-DOS Version 2.00 or higher.

As you can see from the requirements, you use *CoCo-Util* on an MS-DOS machine. So if you have an MS-DOS machine at work and a CoCo at home, you can create data files on your CoCo at home and transfer them to the MS-DOS format at work. When *CoCo-Util* is loaded into the MS-DOS machine, it adjusts itself for the type of video system and the color or graphics card that is active.

The new version has many enhancements. One is the improved use of colors and the screen layout, which includes an option to change the color scheme. If you want the change to be permanent, you can create a configure file that loads each time you call up *CoCo-Util*.

The *CoCo-Util* screen was designed to display as much information as possible without confusion. The layout includes seven areas. The first area, the Dir Info Box, gives information about the current directory that is loaded. This includes the free space left on the drive, and if it is MS-DOS, it displays the pathname to the current directory.

The Date Box displays the day of the week and the system date, along with the DOS version in use. The Files Info Box displays the number of files loaded and the maximum number of files that *CoCo-Util* has room to store in memory at one time. This number is dependent on the amount of RAM. A minimum system of 128K should show a maximum number of between 800 and 900 files. A full 640K has room for 9,999 files.

The Drive Assignment Box displays which drive is assigned to be a CoCo drive and which is the MS-DOS drive. This box is very important when you plan to format a CoCo disk. If you pick the wrong drive, all the data on the disk will be lost. The File Display Box is the largest area. This is where the filenames of the current directory are displayed. The display can show up to three columns of 15 (45 filenames at one time). If there are more than 45 files, you can page up or down through the files. You can also have the displayed files sorted. You have several sort sequence options.

The next area is the Message Line Area. This is the bottom line of the screen and is used to display messages from the program and error messages. The last area is the Menu Box, which is used to display the options available. Since most of the functions are menu driven, another level of options is displayed when many of the options are selected. When *CoCo-Util* first initializes, the primary menu is displayed. The primary menu consists of the following options; Copy, Dir, Erase, Format, Insert, Options, Print, Remove, Shell and View.

The Copy option brings up another menu that allows you to copy between MS-DOS and CoCo files. You can use the arrow keys to mark the files you want copied or you can use the wild card feature. The asterisk (*) and the question mark (?) are used the same way as in MS-DOS. These files will probably be ASCII files, but *CoCo-Util* also transfers binary files. This can be either an M/L program or a binary basic or data file. While a binary file may not run on a different machine, you can modify it in a word processor and transfer it back, or possibly use it for transferring over a modem. In any case, it will transfer it; it is up to you how you will use the file.

The Dir and Erase options are self-explanatory. The Format option allows you to format a CoCo compatible disk. I do have a suggestion here. The format is only 35 tracks, and there are many people who use 40 tracks. I would like to see an option to allow *CoCo-Util* to format either 35 or 40 tracks.

The Insert option is used to insert a line feed following each carriage return. Normally, CoCo text files have lines that are terminated with carriage returns only. In the MS-DOS world, a line feed is used, too. This option should only be used on ASCII text files because if it is used on a binary file, the file will be unusable.

The Remove option is the reverse of Insert, and again should only be used on ASCII text files. If Insert is used on a binary file, you may try to Remove them, but do not be too hopeful.

The Print option allows you to dump any file to your printer using either an ASCII or a Dump format. This is good for printing an ASCII file or for printing out ASCII text in a binary file. You Adventure gamers may find a use for that. The Dump format prints a file in ASCII and Hex, and prints the relative displacement of each byte. In both formats, non-printable characters are replaced with periods.

The Shell option allows you to temporarily leave *CoCo-Util* and perform something in MS-DOS. The View option is similar to Print, but the file goes to your screen.

I was very impressed with this new version of *CoCo-Util*. The screen layout and use of colors add a professional touch. I would like to see the 40/35 track option for the CoCo disk, but overall I liked the program. I recommend it highly to anyone who needs the capability of transferring data between computers. It is very useful if you have text files to transfer. It can also be used to transfer programs written in CoCo Extended BASIC to an MS-DOS machine, modify them, then compile them to run under MS-DOS. If you already have the original *CoCo-Util*, you can get an upgrade to *CoCo-Util II* for $12.95 including shipping and handling.

(Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92691, $39.95)

— Dale Shell

DON'T MISS THE FUN
DON'T MISS THE INFORMATION
Make plans now for
RAINBOWfest Chicago
and we'll see you at the
Hyatt Regency Woodfield on
April 10-12
The excitement's just begun!

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited. (Add $2 for shipping. Californians add 6% state tax.)

Available at
Radio Shack stores
via express order
catalogue #90-0253
90-0254

RAINBOW
CERTIFICATION
SEAL

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

Ultra Telepatch Improves the 'Perfect' Word Processor

Telewriter-64 is, in my opinion, the most popular word processor available for the Color Computer. I base that on the number of program submission articles written with *TW64* that are sent to the RAINBOW by the CoCo community. I use *TW64* on almost a daily basis and have been delighted with its service.

Many reviews have appeared in the pages of the RAINBOW describing *Telewriter* and many of its enhancements. I recently reviewed *Telepatch II*, written by Bob van der Poel, and was pleased with the extra features it afforded. I honestly thought *Telewriter-64* had been perfected, but boy was I wrong!

Just about the time we think something is perfect, someone comes along and improves it. This is the case with the latest endeavor by Mr. van der Poel, called *Ultra Telepatch* Version 3.0. A lot has already been said about *Telewriter*, so I will just point out the main improvements of this latest effort.

Disk I/O — *Telepatch II* gave the option of calling the I/O from disk or memory. The reason for the option was that buffer space was used if you chose to use the memory option. In the *Ultra* version, the disk I/O is stored in memory with no loss of buffer space. This is the best of both worlds — speed *and* efficiency.

Word Delete — The original *TW64* features a character delete, but most of us think in words, not characters. The *Ultra* version features word delete. Just move the cursor to the blank space in front of the object word and press CLEAR and 'Y' (for yank). All characters in the word will be deleted to the next space or carriage return.

Insert Space — Pressing CLEAR and the space bar will now insert a space at the cursor position.

Braces — The special characters { and } can be generated by pressing CLEAR-'H' and CLEAR-'J' combinations.

Find and Global Replace — This enables searches and replacements of control characters as well as normal text characters.

Queuing Files — Now you can use a period (.) as well as a slash (/) for filenames.

The *Ultra Telepatch* disk also contains some new files of special interest that can be merged with the T/BAS boot program:

2COLDIR/BAS — Provides a two-column, on-screen directory format.

TODISK — Forces *TW64* to display the disk menu on start up. This is very helpful if, for example, you need to load in an initialization file.

TPRINT — Provides automatic printing of multiple copies of your text files. No longer do you need to sit in front of your CoCo pressing 'P' for each copy.

The boot program is fully remarked so that the program can be tailored to most individual needs. Here you can select your disk drive stepping rate, turn on and off key clicks and all the other useful features added in the earlier enhancement versions. Extra lines have also been added for the user's special requirements, such as defeating reset protection with `POKE 113,3` or maybe adding special printer control codes.

One other thing. Remember how you used to have to press CLEAR-UP-ARROW after reading in a file, so it would unfold on the screen? No more. Now the text unfolds automatically as soon as the file has read into the buffer.

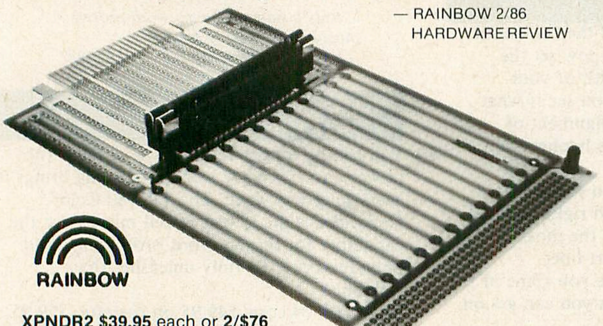
I discovered one potential problem quite by accident. After a lot of frustrated searching for both hardware and software problems, I discovered that if either joystick is plugged in and is approximately in the 10 to 11 o'clock position, the computer appears to lock up while attempting to run the boot or patcher programs. This is not a flaw in the program, but apparently the `USR(X)` calls in these programs conflict with the joysticks. Maybe Mr. van der Poel can solve this little quirk on subsequent releases.

Ultra Telepatch is supplied on disk only and requires 64K RAM and an unpatched version of *Telewriter-64*. It can be backed up for safekeeping, and comes with an 11-page instruction manual that is easy to follow.

I believe you will find *Ultra Telepatch* as impressive as I have. I've learned that with CoCo, anything is possible.

(Bob van der Poel Software, 17435-57 Avenue, Edmonton, Alberta, Canada T6M 1E1, $19.95 plus $2 S/H)

— Jerry Semones



"XPNDR2 and SuperGuide - an Ideal Expansion Card Set"
— RAINBOW 2/86
HARDWARE REVIEW

RAINBOW

XPNDR2 $39.95 each or **2/$76**
This prototype card features a 40 pin connector for projects requiring an on-line disk system or ROM paks. The CoCo signals are brought out to wire-wrap pins. Special gold plated spring clips provide reliable and noisefree disk operation plus solid support for vertical mounting of the controller. The entire 4.3×7 inch card is drilled for ICs. Assembled, tested and ready to run.

XPNDR1 $19.95 each or **2/$36**
A rugged 4.3×6.2 inch bare breadboard that brings the CoCo signals out to labeled pads. Both XPNDR cards are double-sided glass/epoxy, have gold plated edge connectors, thru-hole plating and are designed with heavy power and ground buses. They're drilled for standard 0.3 and 0.6 inch wide dual in-line wirewrap sockets; with a 0.1 inch grid on the outboard end for connectors.

SuperGuide $3.95 each
Here is a unique plastic insert that aligns and supports printed circuit cards in the CoCo cartridge port. Don't forget to **ORDER ONE FOR YOUR XPNDR CARDS**.

Included with each XPNDR card are 8 pages of APPLICATION NOTES to help you learn about chips and how to connect them to your CoCo.

VISA

To order or for technical information call:

(206) 782-6809
weekdays 8 a.m. to noon

We pay shipping on prepaid orders. For immediate shipment send check, money order or the number and expiration date of your VISA or MASTERCARD to:

ROBOTIC MICROSYSTEMS
BOX 30807 SEATTLE, WA 98103

Structure Your BASIC Programs with *LISTER*

One of the first things I learned as a programmer is that the most important part of any program is its documentation. The design and a well-commented listing are as important as the code, if not more so. I had to learn how to comment and arrange listings so that they were readable by other software engineers.

The word that best describes all these things is structure. Structured design, structured coding and structured testing add up to a well-organized, easily read document, created by taking a big problem and breaking it into little, manageable pieces.

The listings printed in the magazines and by our CoCo are dictated by hardware constraints: Every character uses memory (even spaces), the screen can only have so many characters and the page has only so much area (although RAINBOW listings are 32 characters wide to match the screen and aid in finding typos — thanks folks!). Once the program is in your hands and you want to understand or modify it for yourself, it would be helpful to have the listing "structured" and have plenty of "white space" for easier reading.

How does one achieve all this structure and white space when it isn't an original program? How about a utility that makes CoCo do all the work, with a little help from your printer? There is a handy little utility that performs all this magic for you. *LISTER*, written by Bob van der Poel, is a machine language program that takes a BASIC listing and breaks up (structures) a long statement (line of BASIC code) into small, understandable pieces. It indents all `FOR/NEXT` and `IF/THEN/ELSE` groups up to 11 levels to show where they start and end, with everything else in between. Nesting of those structures in a normal listing makes understanding almost impossible. But structure the listing and the nesting leaps out from the paper. If your printer is capable of printing in an emphasized mode (darker, not bigger) and/or in some other character set (e.g., italics), the results can be downright startling.

This program uses no programming memory. It loads in the area of memory that BASIC reserves for graphics. Since we are only going to make new listings and not actually execute (`RUN`) the BASIC program, that memory isn't needed.

The author claims the program will run on any model CoCo. It can be purchased on cassette or disk, and is not copy protected. It comes with a well-written manual (though in places it is hard to read because of poor reproduction) and explains in detail what this utility will do and how to do it.

The program is menu driven, prompts for all necessary information and allows you to print the whole program or any range of line numbers. You can print the listing to the screen, a printer, a disk file or to cassette. You can request pagination, which prompts you for the date and title, though you can put whatever you want for the header. The emphasis can be on or off.

The utility is not formatted for any particular printer, so a BASIC program is also provided to customize the *LISTER* program for your particular brand of printer. The program prompts you for the control codes to make the printer do its thing (emphasis, italics, etc.). The BASIC program loads *LISTER*, modifies it and saves the new version to disk or cassette. This also makes a neat backup program or cassette-to-disk transfer program.

The only problem I had with this utility is that the first time I used it, garbage was printed on my DMP-200 printer. I had it set for 1200 Baud, and the program assumes you are using the Radio Shack standard 600 Baud.

When listing BASIC programs to the screen, especially long ones, it can be a pain stopping them to read a section of code. Mr. van der Poel thought of that, too. The listings to the screen are slowed way down for easier reading. Want to whiz past a section of code? Just hold down the space bar and the listing will rip by. Want to stop it somewhere to study a section? Press ENTER and the listing stops; press any other key to resume. The listing is not particularly neat on the screen, but after all, this program was designed to dump to an 80-column printer.

If you do a lot of BASIC programming or modifying and maintenance of BASIC programs, this utility could be very useful. Although I tried, I couldn't make this program crash. It certainly did everything it claimed to do, and it did it quite well.

(CMD Micro Computer Services Ltd., 10447 124th Street, Edmonton, Alberta, Canada T5N 1R7, $14.95 plus $2 S/H)

— C.L. Pilipauskas

J&R ELECTRONICS

Complete 256K and 512K Memory Expansion Systems
(Hardware, Software and documentation included)
User friendly software, programmer not required

Easy, Solderless Installation

★ We have eliminated the necessity to piggyback for 512K versions! ★

RAMDISK — Fast disk I/O, 35/40 track (two RAM drives with 512K)

PCOPYMOR — More than 30 PMODE 4 screens in memory at once! PCOPY command modified to accept PCOPY 1 to 128. More than 70 PMODE 4 screens and PCOPY 1 to 302 with 512K versions (or 30 PMODE 4 screens with one RAMDISK).

SPOOLER — HUGE printer buffer for offline storage inside your computer while the printer's busy. Customizable from 30K to over 200K (500K with 512K versions). Buffer can be turned off/on copied using simple PRINT CHR$ commands.

OS9 Ramdisk — Fast OS-9 disk I/O! 35/40 track single sided or 40 track double sided (512K) Ramdisk under OS9! GOOD's OS9 Ramdisk (Rainbow Feb '86) with fully commented source code and install files added by J&R. (Requires OS9 operating system)

ALL software above is configurable for 256K/512K operation.
Software shipped on disk, add $10.00 for software on tape. (OS9 RAMDISK not available on tape).
ALL boards below are 256K/512K capable, software & documentation included.
New SAM (74LS785) not included (use your 74LS783), 74LS785 recommended for 2.0 MHz operation.

Part number	Price	Description
#1001	$39.95	Banker II bare board (with long pin socket, does not include memory Expansion Board)
#1002	$69.95	Banker II bare board + parts (does not include Memory Expansion Board)
#1003	$89.95	Banker II assembled & tested (no memory)
#1004	$129.95	Banker II (256K, upgradable to 512K) assembled & tested with memory
#1005	$169.95	Banker II (512K) assembled & tested with memory
#1006	$15.00	Memory Expansion Board
#1007	$29.95	Memory Expansion Board + parts
#9000	$89.95	Down Under Controller. Ram Pack size controller with BDOS Gold plated, high reliability edge connectors, jumpers for 24/28 pin ROM. Compatible with COCO I and COCO II.
#9001	$35.00	BDOS (Enhanced DOS on 27128 EPROM)
#9002	$5.00	64K switch
#9004	$24.95	New SAM 74LS785 (required only for 2.0 MHz operation)
#9005	$24.95	★New!★ PowerBasic — Introductory Price. (Requires RSDOS 1.0 or 1.1 and 256K or 512K Banker) Utilize the extra memory for variable storage and pass variables between programs in different pages of memory. Split a large BASIC program into smaller pieces and GOTO or GOSUB a line in another page of memory. . . and more features included. (disk only)
#9006	$10.00	S/W Pac upgrade. 1.XX to 2.XX

To place an order, write to J&R Electronics, P.O. Box 2572, Columbia, MD 21045,
OR call (301) 987-9067 — Jesse or (301) 788-0861 — Ray.

HOURS: Weekdays 7 p.m.-9 p.m.; Sat. Noon-5 p.m. EASTERN TIME.

Add $4.00 shipping & handling (FOREIGN ORDERS $7.00), COD charge $3.00. Maryland residents add 5% state tax.

CHECKS, MONEY ORDERS OR COD's only please (personal check — 2 weeks for clearance). IMMEDIATE DELIVERY. Give COCO Radio Shack model # (i.e. 26-3136), Disk or Tape when ordering.

QUANTITY DISCOUNT AVAILABLE. For information on shipping or previously placed orders call (301) 788-0861. COCO II 26-31XX owners call (soldering experience may be required).

Hardware Review

Diary of a Digitizer: Digisector DS-69A

By Kerry Armstrong

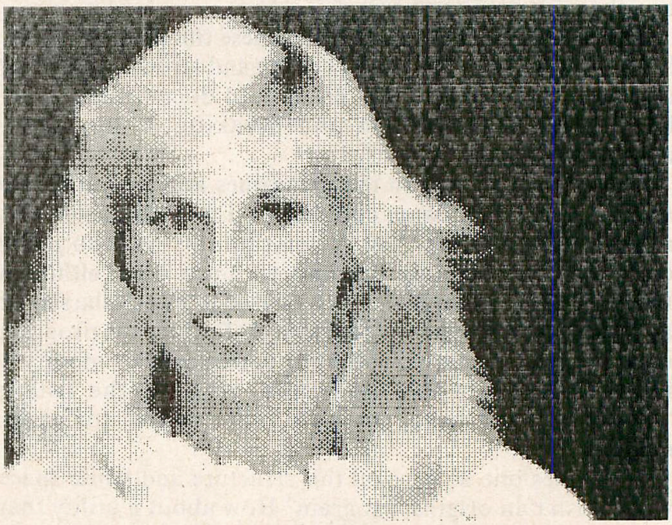
FRIDAY, P.M. Wife calls me at work to tell me a package from RAINBOW has arrived. Excitedly, I ask her to open it and tell me what is inside. With computer widow disinterest she reports it is a request for a review of The Micro Works' Digisector DS-69A, and that the package includes a disk, a manual and a ROM Pak. I can hardly wait to get home. She informs me that because it's both Friday and payday, she expects to be taken out to eat this evening. Darn, I wanted to rush home and play with the Digisector. I already know the purpose of the DS-69A is to produce digitized printouts of video pictures. (I've been reading ads in RAINBOW, much to my wife's chagrin — she knows that usually means more strain on the charge cards.) At least I will get a chance to read the manual late tonight.

SATURDAY, A.M. Unlucky break again. Two weekends a year I have to work. This is one of them. I would rather have done some "serious" work on the DS-69A review. Oh, well. Nothing is planned for this evening. I take the manual to work with me, though. I'll sneak a few peeks at its 26 pages whenever I get a chance.

SATURDAY, P.M. Home from work at last. Time for some hands-on use of the Digisector. By now I have thoroughly read the manual and learned that the DS-69A is an improved version of the original DS-69. This new version supports the use of a color video camera and a 'Y' cable for disk operations, and digitizes a picture four times faster than the original. I've also learned that the DS-69A, like the DS-69, comes in either a cassette or disk version, and functions identically except for the I/O. The manual indicates that the first step is to run the config program on the C-SEE III program disk.

I determine that you don't need to have the hardware/video part set up just to configure the system. I run the config basic program. It asks if I have DS-69 or DS-69A and whether I am using a PBJ C-C Bus, Radio Shack Multipak or a 'Y' cable. (I have the Multipak.) Then it asks which slot I'll be using for the DS-69A ROM Pak. Next, it asks whether I'll be using *CoCo Max* or *MagiGraph*, so it can automatically add the proper extension to the five-level mode pictures when saved to disk. (The 16-level picture disk saves use the extension *PIX*.)

Finally, it lists about 15 different printer types and asks which one I'll be using. Epson is one of them and I have an old Epson, but I have my Tandy DMP-130 hooked up to the system. The DMP-130 is not listed on the screen menu, so I try putting the DMP-130 in the IBM mode, which is supposed to be the same as an Epson. No go. It's got all those extra little line feeds that make the printout look like it has been run through a paper shredder. (Micro Works includes three demo pictures on the disk that can be loaded in and printed out for this testing.)



Sample DS-69A Digisector screen dump

While the DMP-130 is still in the IBM print mode, I try the Gemini printer driver (I've had success with this before). I get a whole printout, but it is really squashed. Got to be something better than this. I check the manual, which has several pages about printer drivers. It gives technical data on how to write a custom driver in machine language. It says you can even receive sample source codes from Micro Works to use as a guide in writing one. It also mentions that if you do write a custom driver, they would like you to pass a copy on to them and they will distribute it as public domain software to others who might need a similar driver. Finally, they indicate that you should give them a call before you write a driver, because they might already have one they

ORDER PHONE (416) 456-0032

To order or for further information or program suggestions please write:
Duck Productions, 18 Rowe Court, Brampton, Ontario, Canada L6X 2S2
WATCH FOR **MACHINE GENESIS**, a three program utility and tutorial for beginner exploration of machine language progamming. **COMING SOON!**

DUCK PRODUCTIONS QUALITY COMPUTER PRODUCTS

AMERICAN EXPRESS

KEEPING TRACK

NINE PROGRAMS, so easy they're almost user independent! More than the average diskette management sysyem, ITS A BOOT UTILITY!

YOU'LL WANT THIS KEYSTROKE BOOT EVERYTIME YOU POWER UP!

Creator builds the **"D"irectory** program with your inputed I.D. names on your disks. **D** will load and run basic or binary programs, on any drive, with a single keystroke. **D** gives continuous access to directories without retyping DIR and auto displays the disk I.D. names, program names/ext/type/size and free disk space. **Directory Print** accesses **D** for your disk I.D., programs and free space to format and output your program catalogue, to your printer. **Comparison** backup utility, compares backup disks and by keystroke, copies missing files to either disk. **Directory Saver** copies directories to a safe area. On dir crash, a keystroke will repair the damage. Other programs include **Alpha Directory** reorder, **Disk Address** finder, and **True Drive Test.** All programs fully documented. $29.95, ($38.95 CDN)

RAINBOW CERTIFICATION SEAL

MAP'n ZAP

The laymans kit for disk repair. Step by step procedure to repair directories and grain tables. Locates errors, maps out disk contents with printer or screen output, will backup any flawed disk, and prompts built in disk zap for repair. Complete with documented tutorial on disk input/output operation, access. $19.95, ($24.95 CDN)

MICRO • FIRE

Have you beat your thumbs more than the aliens? You need a secret weapon! This automatic rapid fire circuitry package can be added to any joystick. It has on/off control and does not affect computer when not in use. No extra power supply required. Installation in minutes, preassembled hardware comes with complete instructions. Custom component has adjustable rate of fire and comes with a full calibration program. $19.95, ($24.95CDN)

CODE BUSTER disassembler

Explore machine language programming with an easy, accurate breakdown of any binary program. Screen or full printer output with helpful hints to understanding your ROM. Simple prompted procedure will answer questions in your study. Fully documented instructions. $19.95, ($24.95CDN)

could send you. This is Saturday, however, so I can't call.

Back to the printer menu on the screen. I notice quite a few Tandy DMP printers listed, but not the DMP-130, so I put the printer back into the Tandy mode and begin trying. The DMP-120 and DMP-245 drivers don't work. I try the DMP-100 driver. Eureka! Success at last. The five-level scan picture, BEAR/MGF, prints a small 2⅝ by 4¼ inch picture. The two 16-level pictures produce 6¼ by 8 inch pictures. (I later learn the pictures are about the same size on the Epson printer, but that they may vary greatly in size on other printers.) Time for a break while I study the manual for the hardware/video set-up.

SATURDAY, MUCH LATER P.M. Time for serious use of the CoCo. I install the DS-69A ROM Pak in the Multipak slot one, and hook up my VCR (the Digisector will use any standard NTSC direct video input). Then I run a standard RCA plug-type video cable from the direct video output of the VCR to the RCA socket on top of the DS-69A ROM Pak. Now it's time to fire up the VCR and the CoCo and boot up the configured C-SEE III program.

The program is menu driven, and optional joysticks may be used instead of keyboard input. I start a prerecorded video tape running and start out with the five-level scan, command 'G' on the menu. I learned from the manual that the five-level scan is the quickest of all the digitizing modes. The DS-69A breaks up a video picture into five different gray levels or brightness levels. If you look at a black and white photograph in a newspaper with a magnifying glass you'll get a good idea of what I'm talking about. Notice that the different areas in the news photo are made up of tiny dots and the density of those dots creates the light and dark areas of the photo. A proper five-level printout should have five distinct areas of grayness or brightness, with the totally black areas being completely filled with dots and the totally white areas being completely devoid of dots.

The C-SEE III program provides me with some control over these areas, since it has on-screen brightness and contrast controls that operate much like they would on a television set. By using these in conjunction with the 'G' command I can just watch my CoCo monitor, make any adjustments to the display, and then press the 'T' key on the keyboard or the left joystick firebutton to save a video picture. The picture is "taken" almost instantaneously. I can review the picture by using the 'M' command, which toggles back and forth between the menu and the five-level picture graphics page. (If the action on the VCR is too fast, the manual recommends freezing the picture before "taking" or digitizing it.)

Next, I shift to the printer menu, make sure the printer Baud rate is correct, press the menu command to print a five-level picture and watch the printer go. Pretty neat so far. If I want to save this picture I can go back to the main menu, then to the disk menu, and save it to disk. Uh oh, look at the clock. I have to work tomorrow too. Reluctantly, I shut everything down for the night.

SUNDAY, P.M. Home from work, chores done. Now back to the CoCo and the DS-69A. Yesterday, I was working on the five-level pictures. These are the only ones that are saved as binary picture files, which can be loaded and displayed from a basic program or loaded into several of the numerous graphic drawing programs and worked on. You merely have to change the extension in some cases. The C-SEE III program will even save them on a Graphcom Picture Disk in the Graphcom format. The possibilities of editing, manipulating and printing are endless. This also means that if you are unsatisfied with the smallness of the C-SEE III five-level printout, you can load the file into another program that makes a bigger printout. Additionally, it means that you can share your digitized pictures with others and they don't have to have a DS-69 or DS-69A system to print them out.

Today though, I am going to work on the 16-level gray scale pictures. The five-level pictures are good but the picture resolution is rather limited, with only five tones of brightness. Since the human eye normally is only able to perceive 20 to 30 levels of brightness at one time, 16 levels should be great.

The Digisector with the C-SEE program has two modes of 16-level reproductions. One mode scans 128 vertical by 128 horizontal points of brightness across a video picture; the other mode is 256 by 256. Each one of these points is classified by the computer into one of the 16 levels of grayness or brightness and stored in an array in the computer's memory. Because of the hardware limitations of the CoCo, a full 16-level picture cannot be displayed on the screen. What you get is an averaged three-level picture on the screen. You still have the ability to control the brightness and contrast as in the five-level mode, though. Therefore, you have to do some experimenting to get the right levels for printing out. Also, the scans take much longer, particularly the 256 by 256 mode, so "freeze frame" on the VCR is essential.

The resulting picture is not saved to the disk as a binary picture file, but as a data file just as it is stored in memory. The 128 by 128 mode makes a four-granule file, and the 256 by 256 modes make a 15-granule data file. Therefore, you

SPECTROGRAM
MAGAZINE FOR COLOR COMPUTER USERS.

Spectrogram Magazine provides useful and interesting support material with a wide range of programs and articles by some of the best writers and programmers available.

***TELEGRAM by Bobby Ballard: A monthly column concerning the Color Computer and its use in telecommunications.**
***DOWNTIME by Rush Caley: Little-known facts, new and different ideas, opinions, and an occasional criticism or two.**
***BASIC HELP by Bill Bernico: Answers to your questions concerning the Color Computer and the BASIC language.**
***PASCAL PROGRAMMING by Delmar Searls: An in-depth study of Pascal and how to use it effectively.**

Assembly, C, OS-9, REM statements as data storage, floating point math, and graphics animation are covered with an emphasis on *understanding*. Utilities, games, business and home management programs are a steady diet, and all the programs in Spectrogram are available on tape or disk. *Spectrogram Magazine could become the most informative addition to your Color Computer system!*

PLEASE SEND ME 12 ISSUES OF SPECTROGRAM MAGAZINE FOR $18 (*40% off the cover price*).
Name: ______
Address: ______
City: ______
State: ______ Zip: ______
( ) Check enclosed ( ) Visa ( ) MasterCard
Card # ______ Exp. Date: ______

Mail to: SPECTROGRAM MAGAZINE
P. O. Box 138 (815)968-9600
Rockford, IL 61105

Foreign subscriptions: $26 Canada, all others $34
Groups: $15 with 5 or more subscriptions

cannot load and display these files with a regular graphics program.

I "shot" a few *16*-level pictures from the VCR tape and printed them out. They made remarkable graphic pictures. The best were close-ups of the actors with light backgrounds and front-lighted faces. However, getting good printouts at the 16-level modes does require a good deal more "fiddling" with the contrast and brightness controls of the C-SEE program. Time to hit the sack again. More "serious" work tomorrow after work.

MONDAY, P.M. Time to hook up a video camera and see what the DS-69A will do. I dig out my color video camera and plug it into the VCR. (It is possible to get an old closed-circuit video camera and plug it directly into the DS-69A ROM Pak.) This time, as recommended by the Digisector manual, I also hook up a monitor off a tee on the line between the VCR and the DS-69A ROM Pak, so I can compose my shots with the video camera.

I soon learn that even though I am using one of those "low-light" video cameras, I get better indoor pictures if I use an augmented light source. Front lighting and a light background work best. I draft the kids as models. The five-level picture is fast and works fine. Even the 16-level, 128 by 128 mode is pretty fast, but the 16-level, 256 by 256 mode soon gets to be a chore for active kids. Even a few seconds of absolute stillness seems like an eternity to them. I do get some very good printouts though.

Since it begins to look like I'll have to bind my models to the chair, I decide to try another test. I cut out a few pages of models from a clothing catalog. With the zoom lens on my video camera, they make perfect models. They don't move, they don't chew gum, they don't blink, and they don't suddenly have to go to the bathroom in the middle of a long scan.

I spend the rest of the evening "shooting" pictures, trying different light arrangements, saving pictures to disk, printing reams of paper — in short, running the DS-69A and C-SEE III software through all the various tests I can devise. I only come up with two complaints. First, the speed limitations of the CoCo and the time it takes to do a 16-level, 256 by 256 mode scan, and second, the lack of an "abort print" command to abort a printout of the larger 16-level picture. It only takes a few printed lines to tell you that you didn't quite get this one right.

TUESDAY, P.M. Home from work. Time to get to the technical part of the review. First, the manual. As I mentioned it is 26 pages long. It contains sufficient information for the beginner, as well as more detailed information for the technically oriented user or programmer. It explains how to use some of the additional programs on the C-SEE disk to get 64 gray levels and 256 by 256 resolution. (The resulting picture file will be 29 granules long or a full 64K in length!) Also, there is information on how to use the DS-69A as a motion detector in a program called *Burglar/Bas*. As mentioned before, there is information on writing your own custom printer driver. It would have been helpful if Micro Works had included the source codes in the manual for a couple of the printer drivers, like the Epson and Radio Shack ones. Also, a little more needs to be said in the manual about modifying the config basic program to install a custom printer driver.

OK then, time to examine the hardware. The ROM Pak is black plastic, without a sliding door to protect the card edge connector. The manual warns that it contains MOS integrated circuitry, which may be damaged by static electricity, so don't touch the exposed card edge. In addition to the RCA socket for the video cable connection, it also has a small screwdriver access hole so that some adjustments can be made to the width of a picture to adjust those printers that cannot seem to get the width-to-height aspect ratio right. The edge connector is not gold plated.

WEDNESDAY, P.M. Time to write the review. If I can get this thing done, I'll have a long weekend to play before I have to start getting ready to ship everything to RAINBOW. I collect all my notes and reams of printed out pictures. I need a new printer ribbon. The newer the ribbon, the better the picture quality.

Micro Works' advertisements indicate they have been working in the area of video digitizers since 1977. Their expertise really shows in the DS-69A; it does an excellent job. The results are every bit as good as the digitized photos you get at the local fairgrounds. In fact, with recent advertisements for transfer printer ribbons, if someone would come up with a program to "flip" the 16-level gray scale pictures, you could probably print your own photo T-shirts, calendars, and scarfs with your favorite Digisector DS-69A digitized photo.

Micro Works provides a one-year warranty on hardware, as long as the case is not opened. They also offer a refund-satisfaction guarantee. If you are not completely satisfied with the performance of the DS-69A, you may return it, undamaged, within 10 days for a full refund. They'll even pay for the return shipping cost. However, from my all-too-brief experience with it, I bet they don't have very many folks taking them up on their refund offer.

(The Micro Works, P.O. Box 1110, Del Mar, CA 92014, 64K disk or cassette, $149.95)

● COLOR BANKBOOK $19.95

● BUSINESS BANKBOOK
SYSTEM ONE
FOR ONE DISK DRIVE $49.95
SYSTEM TWO
FOR TWO DISK DRIVES $49.95

● VCR FILE $19.95

● SUPERDISK UTILITY $ 9.95
SEE REVIEW IN MAY '86
RAINBOW PAGE 191

● RADIOLOG $ 9.95
SEE REVIEW IN MAY '86
RAINBOW PAGE 209

● CODE PRACTICE $ 9.95

ORDERS OR INFORMATION
CALL 1-800-628-2828
EXTENSION 552

ALL PROGRAMS INCLUDE MANUALS,
REQUIRE 32K AND 1 DISK DRIVE.
ADD $2.00 SHIPPING & HANDLING
FLORIDA RES. ADD 5% SALES TAX

RAINBOW
CERTIFICATION
SEAL

SUNRISE
SOFTWARE

8901 NW 26 ST DEPT R
SUNRISE, FL 33322

Pick a Winner: *Probaloto Version 2.0*

Probaloto by Gary Olander is a program used for selecting lottery numbers and numbers for other games of chance. I refer readers to the review of the first version, which appeared in the October '85 issue, for details of program operation.

Probaloto can be used to choose numbers from a selected range to suit the requirements of the particular lottery to be played. For example, when used for what is called the regular lottery game, *Probaloto* can pick six numbers from one to 40. The numbers selected can be strictly random if desired, but the real power of the program is geared towards making weighted random selections. To utilize this feature, lists of past winning numbers (available at ticket sales locations) are entered into a data file. Using this data file, selections can be weighted towards either the most picked or least picked numbers, depending on your philosophy regarding the workings of lady luck. The weighted selection procedure operates as if you place numbers in a hat in proportion (direct or inverse) to how many times that number has been picked. Selection from the hat is then random, but weighted. All of this is easily accomplished with this menu-driven program.

Version 2.0 includes several new features and improvements over the first version. After printing or saving a data file with the old version, the user was returned to the beginning of the program with initial questions about the particular lottery being played. I suggested it would be more efficient to return to the main menu at this point, and Version 2.0 does just that. The new version also makes it easy to return to the main menu if you make an error while entering a data file, or to exit *Probaloto* without going to the main menu. The new Reset option makes it easy to reset the printer or the specifications of the lottery. In addition, *Probaloto* now checks the amount of memory and automatically adjusts the data file to that size to allow large data files to be used even with 16K machines.

For most purposes, *Probaloto* sorts the numbers selected. When selecting three or fewer numbers with Version 2.0, the numbers are not sorted. This is so the weighted selection procedure can be used to pick win, place and show in a horse race. With the printed odds entered into a data file and weighting done towards the least picked, first, second and third places can be selected randomly, weighted by the odds.

Of my criticisms mentioned in the prior review, only one remains. The data file printout still consists of a narrow column of figures near the left margin, using more paper than would be necessary if it were better formatted. Mr. Olander responded, pointing out that not knowing how many numbers are to be printed makes formatting difficult. From my programming experience, I have to agree— but I know it can be done. As the printout for a one to 48 lottery still takes less than one sheet, my criticism is very minor.

Probaloto is easy to use and does just what it purports to do. Version 2.0 does it even better. I would recommend it to anyone interested in using their CoCo to attempt to pick winners.

(Gary Olander, 322 Haymarket Pl., Gahanna, OH 43230, 16K ECB tape or 32K ECB disk, $19.95)

— Stanley Townsend

CoCo Trend

Computerware Utilities

Name brand software
at least **20%** off
suggested retail.

Prickly Pear Entertainment

15001 Glory Dr. Huntsville, Alabama 35803
(205) 880-COCO (2626)
Call or write for free catalog.

TANDY COMPUTER DISCOUNTS

COLOR COMPUTERS

26-3127 64k color comp	140.00
26-3131 1st disk drive	269.95

PRINTERS

26-1276 DMP 105	160.00
26-1277 DMP-430	580.00
26-1280 DMP-130	269.00

MODEL 4 and MSDOS COMPUTERS

25-1050 Tandy 1000 EX	650.00
25-1051 Tandy 1000 SX	950.00
25-01011 Plus expansion board	155.00
25-1005 2nd drive mod 1000	145.00
25-1020 VM-4 Monochrome monitor	110.00
26-1070 mod 4D 64k 2dr.	920.00

We Carry the Complete Line of Tandy Computer Products at Discount Prices

CALL FOR A FREE PRICE LIST 800-257-5556
IN N.J. CALL 609-769-0551

WOODSTOWN ELECTRONICS
Rt. 40 E. WOODSTOWN, N.J. 08098

Liberate Your CoCo With PBH-64 Print Buffer

Most of us are familiar with the advantages of a software printer spooler that stores text in protected RAM, allowing the computer to do other tasks while the printer prints the stored text. On the CoCo, however, there are distinct disadvantages to software spooling — specifically, that valuable memory is used and computer I/O functions are slowed down.

The PBH-64 Print Buffer solves both of these problems, and at the same time provides a serial-to-parallel interface. With this easily-attached device, your text is stored in its own 64K memory leaving CoCo completely free to go about other tasks without I/O slowdown. It still takes time, however, to fill the PBH's memory, so the longer the text or program listing, the longer it will take for CoCo to be ready to do something else.

As a test, I printed out a 10K *Telewriter-64* file at 9600 Baud through both the PBH and my trusty old serial-to-parallel interface. The difference was impressive! The PBH was filled in 18.54 seconds. At that point, my CoCo was able to go about any other task I wanted it to do because the printer was now being controlled by the PBH-64 Print Buffer. It took two minutes and 39 seconds to print the file through my parallel-to-serial interface. I was so impressed with the ability of the PBH to control the printer, I even turned off the computer while printing continued! This is not recommended, since AC-line spikes can occur which could cause malfunctions in printing, but is does make you a believer.

There is no printer Baud rate select switch on the PBH-64 Print Buffer. All there is, besides a power-on light, is a button labeled CLEAR that must be pressed whenever you want to load in different text or change the printer Baud rate from its previous speed. You can select printer speed by simply typing the familar `POKE 150,X` or adding the `POKE` into your BASIC programs. Just like CoCo, this device defaults to 600 Baud.

The only negative point I can see with this unit is that it does not contain a "repeat" or a "copy" button to allow multiple copies of the text in its memory. After talking to PBH's president, Jim Baxter, I learned that while he agrees it would be a desirable feature, it would require additional I.C. chips and components that would not fit on the existing printed circuit board. He felt the added cost could not be justified in terms of added sales. Who knows, maybe if they get enough requests for the feature it can be added on later models. Or perhaps some hardware hacker will come up with a modification to this current version that will incorporate the feature.

The unit is well-built and housed in an off-white plastic box to match the present CoCo color. It comes well-packaged, and includes a plug-in wall transformer for its power source. Also furnished is a cable to attach the unit to any Centronics-compatible printer. (I used it with a Gemini-10X.)

Hook-up is a snap. Plug in the power source and connect the furnished ribbon cable between your printer and the PBH-64. You will have to supply your own serial printer cable (RS 26-3020) to connect your CoCo to the *PBH-64*.

I like this product. It's easy to use and comes with an illustrated four-page instruction manual that even includes a schematic. (How about that, hardware hackers?) So, if you would like the convenience a hardware printer spooler offers, you will like what this product can do.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414, $149.95 plus $3 S/H)

— Jerry Semones

Formaker
clean paperwork for business
"It will give the small or home business professional-looking forms and effortless, errorless totals, accounting for taxes, discounts, shipping and deposits."
The RAINBOW, May 1986

menu driven
customize for your company
on screen instructions
creates: invoice, quote, purchase order,
mail order, receipt, letter
printer customization
and much, much more

RAINBOW CERTIFICATION SEAL

$49 32K ECB disc

"You have to look good to the customer . . . This program helps . . . by providing neat, well-prepared forms . . ."
The RAINBOW, May 1986

SUPER TUTOR

RAINBOW CERTIFICATION SEAL

Makes learning so much FUN . . .
. . . that kids think it's a game!
Letter and number recognition. Ages 2 to 6
$24 32K ECB disc or tape

"If you are looking for a program to teach young children the alphabet, numbers and early vocabulary, SUPER TUTOR may fit the bill." The RAINBOW, June 1986

Send for more information:
Challenger Software
42 4th Street
Pennsburg, PA 18073
Call (215) 679-8792 (Evenings)

CoCo Repairs
• • • *$25 Plus Parts* • • •
HARDWARE MODIFICATIONS

Front Panel Controls
Monitor Drivers
UPS Memory Backup
Memory Upgrades
Keyboard Upgrades
ROM Upgrades

AND MANY MORE!

Special Requirements? Just let us know.
Rowe Electronics Co., Inc.
5137 Goldman Dr. • Birmingham, Al 35210
(205) 956-4943

Challenging *LEO* Keeps You on Your Toes

In this game you must explore the planet Leonax. Although you have a tank with an adjustable cannon, your fuel and ammunition are limited. As you go exploring, you will notice Leo eggs scattered through the levels. From these eggs hatch various types of Leo creatures who do their utmost to destroy you. Your ultimate goal is to survive as long as possible.

LEO requires 64K and two joysticks, is available in disk or cassette versions and uses the high-speed POKE. If your computer can't utilize the high-speed POKE, this software won't run.

The game is nicely packaged, but the instruction sheet contains only the barest minimum to get you started. Learning to play the game is a matter of trial and error as you try to figure out what is going on. For instance, you are told that flags and pylons replenish your fuel and ammunition, but you are not told that you must leave the tank in order to pick them up.

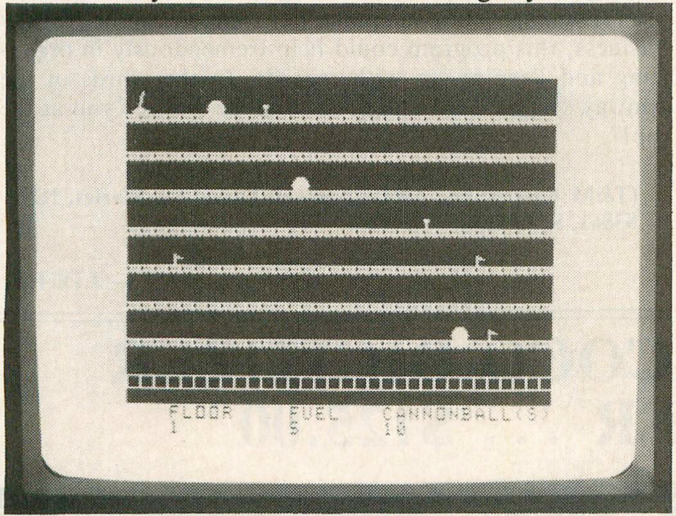


Figure 1: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

After loading and executing this machine language game, you are treated to a lengthy display of the title and copyright with some cute graphics. Unfortunately, any time you are killed you must sit through this long display before you can start playing again.

You need to use both joysticks, the space bar and the ENTER key to play. The left joystick controls the forward speed of the tank as long as you still have fuel. The right joystick aims the cannon. Shooting straight up or down usually destroys the tank. Pressing the space bar fires the cannon. Of course, this only works if you are in the tank and have ammunition left. Pressing the ENTER key allows you to exit the tank. While on foot you can move forward or backward, and traveling on foot conserves fuel.

Each screen consists of eight floor levels scattered with Leo eggs, fuel flags and ammunition pylons. (See Figure 1.) The Hi-Res graphics are cute but unsophisticated. You must work your way down the eight levels and leave the screen to get to the next screen. The types of Leos and the placement of flags and pylons are different each time, but otherwise the screens are identical.

There is no score other than the number of screens you survive. Your tank cannon is a stun gun and can be used to blow holes in the floor (for a shortcut) or to immobilize a Leo. If you take too long to reach the bottom of the screen, the Leo will wake up and chase you again.

In order to collect flags and pylons you must leave the tank and travel on foot. This is also the only way to travel backward. If the tank is destroyed or runs out of fuel (or if you simply like danger), you can abandon it and continue on foot. You can sometimes maneuver a Leo into cutting through the floors and you can then use the holes as shortcuts. If you lose or abandon the tank, you receive a new tank when you reach the next screen.

Occasionally, between screens, a bonus round of target practice gives you extra fuel and ammunition. There seems to be no way, however, to predict when these bonus rounds will occur.

LEO is fun and challenging to play. There is no single strategy or easy pattern to follow. Instead, you can easily spend many enjoyable hours trying out new tricks to get past the Leos.

If you are tired of mindless shoot-'em-ups, give *LEO* a try.

(Lomiq Inc., c.p. 105, Succursale A, Jonquiere, Quebec, Canada G7X 7V8, cassette $24; disk $26.95)

— James Ventling

ADOS ENHANCED, EPROM-ABLE DISK BASIC

Now, you can supercharge Basic with an impressive array of extra features WITHOUT sacrificing compatibility! ADOS is compatible with virtually 100% of commercial software. Customizing utilities are provided to allow user-defined command abbreviations, baud rate, step rate, tracks per disk (35 or 40), support of double-sided drives, and more. After customizing ADOS, you can have it burned into an EPROM that plugs into the Disk Basic ROM socket, or just use it in RAM as a 64K disk utility. (EPROM + burning will cost about $20--we provide information concerning how you can have this done.) Features include: • repeat and edit of the last direct-mode command • 26 definable control-key abbreviations • automatic line-number prompts • DOS command • lowercase command entry (a fine complement to a Lowerkit or PBJ WordPak) • COPY (filename) to (drive number) • AE error override option • RAM command (64K) • RUNM command • text echoing to printer • ML monitor • text file scan • enhanced directory • error trapping • hi-res text utility included (42, 51, or 64 characters per line)

"I COULD NOT FIND ANY SOFTWARE THAT WOULD NOT RUN UNDER ADOS."
THE RAINBOW, December 1984
"I LOVE ADOS! . . . A GENUINELY FIRST RATE PRODUCT."
Color Micro Journal, February 1985
"I WON'T PART WITH MY ADOS EPROM FOR ANYTHING . . . NO COMPATIBILITY PROBLEMS."
Hot CoCo,May 1985

Disk . . . $27.95

THE PEEPER ML PROGRAM TRACER

Monitor machine-language programs AS THEY ARE RUNNING! Peeper actually timeshares with the target program, giving FULL CONTROL as ML programs run. Switch instantly between watching regular program output and Peeper's trace of registers and stack on screen or printer. Inspect memory in any of 26 display modes. Execution speed can be varied from full speed to the barest crawl, or halted entirely, as programs run. Single-stepping, breakpoints, memory or register examine/change. Relocatable, supports 64K use. (16K required) See February '85 review.
Disk . . . $23.95 Tape . . . $21.95 Assembler source listing . . . Add 3.00

FASTAPE THE NEXT BEST THING TO A DISK DRIVE

Fastape allows cassette I/O at 3000 baud--TWICE NORMAL SPEED. It uses the high-speed (POKE 65495,0) mode, and makes it convenient to stay in this mode throughout. Features automatic adjustment of cassette and printer parameters when speed mode is changed. Control-key functions for many Basic commands and for changing speed modes. Compatible with all file types, and can be used with **Telewriter 64 and many other tape utilities. (16K required) See July '83 review.**
***Tape . . . ~~$21.95~~ $11.95 (NEW DISCOUNT PRICE!)**

SPECTROSYSTEMS
11111 N. Kendall Drive,
Suite A108
Miami, Florida 33176
(305) 274-3899 Day or Eve
No delay on personal checks
Please add $2.00 shipping. Sorry, no credit cards or COD's

Organize Your Amway Business With *CoCoachiever*

CoCoachiever was developed for the Color Computer by T&M Enterprises. It requires a 64K Color Computer and one disk drive. The program was written by and for Amway businesses and distributors, and allows you to keep track of distributors, orders, PV-BV bonuses and price lists. The current version of the program contains prices for May 1, 1986.

The system contains a loader menu which allows you to select a printer Baud rate. Once selected, the program loads in the Master menu. Before the menu is displayed, the computer loads the stock numbers. In fact, the stock numbers are loaded every time you go from one part of the program to another. This is because each menu application has its own basic program, which is automatically loaded. This is great for organization and development of a software package, but it does slow things down a bit!

Distributors are entered into the program by name and ADA number. There are prompts for Sponsor's Name and PV-BV.

Other items on the Distributor menu allow you to List Distributors, Review/Revise PV-BV, Calculate PV-BV Bonuses, Add Miscellaneous PV-BV Items and Return to the Master menu. For most functions, a hard copy can be obtained by answering the prompts. Your printer must be online or the program will hang up.

The Master menu has three items: Input or Check Orders, Distributors menu and Price List menu. To enter or check orders, insert the date and distributor number, then list quantity and item number (stock number). The printed copy is an invoice or packing list for filled orders. There are some nice features here, including the capability of handling returns, exchanges, tax and charges. By entering the stock number, the items are listed (or printed) out with all information, including the price that was stored on the program disk. The completed order contains the item totals, the PV and BV, the wholesale and retail amounts, sales tax and handling charge.

The Price List menu requires a password. Once entered, you can input/add to the price list, change the price list by stock number, change the price list by record number or print the price list.

The *CoCoachiever* is a menu-driven system that is well-developed and easy to use. The printed documentation is brief (five pages) but adequate. For someone in the Amway business, this program could help tremendously in organizing and keeping up with records. In the words of the Amway system, "Go and grow, and we will see you at the top!"

(T&M Enterprises, 2301 Cromwell Drive, St. Maries, ID 83861, $49.95)

— J.D. Ray

THE BEST SELLING COCO DIGITIZER
JUST GOT BETTER . . . $125.00

GRAPHICOM/ VIDEO DIGITIZER

Input directly into Graphicom for easy enhancements, manipulation, stamping, and storage. Accepts composite video signal in (1.0v p-p) from video camera, VCR, video disc player, another computer, or other compatible video sources. View ''off air'' or ''VCR'' digitized video at close to real-time (a full 13 frames a second!!). ''Snapshot'' video frames to the digitizer's internal memory.
Use with your multi-pak, ''Y'' box, or a ''Y'' cable (''Y'' Box Cat. No. 162CH available at $29.95 / ''Y'' cable Cat. No. 137CH available at $19.95)
Video is input via a RCA phono connector. External controls for HORIZONTAL POSITION, VERTICAL POSITION, HORIZONTAL WIDTH, BRIGHTNESS, and CONTRAST (FUZZ) settings.
Don't be fooled by imitations . . . this is the GRAPHICOM VIDEO DIGITIZER
REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS. A FREE GRAPHICOM PROGRAM, AND PICTURE DISK ARE SUPPLIED WITH PURCHASE OF VIDEO DIGITIZER (A $50 VALUE) . . . NEW LOW PRICE! $125.00

ADD $5.00 FOR HANDLING • SHIPPED FREE, FEDERAL EXPRESS

Check or M.O.

Computize INC.
(215) 946-7260 P.O. BOX 207 • LANGHORNE, PA 19047

PA residents
add 6%
sales tax

Paper Route Delivers Action

Ever since I saw the first few Diecom games, I have had an admiration for their quality and graphics. So I was thrilled to receive *Paper Route* to review. When I opened the package, I thought WOW!, this is going to be great, and I was right. *Paper Route* is an excellent example of Diecom's commitment to superior quality and graphics.

Paper Route is a 64K action game that requires one joystick. It is made for only one player. The object of the game is to direct a paperboy along his normal route, while delivering newspapers to his customers. This is by no means an easy task. The customers' houses are marked with red doors. You must deliver a newspaper to each house every day, or the customer will cancel his subscription.

You start out with 10 newspapers to deliver. At various points along the way, you find extra papers (in stacks of 10) that you can pick up by riding over them with your bike. As the game progresses, these papers will be in fewer and harder places.

Bonus points are awarded for many things. First, breakage points are awarded for knocking over garbage cans and tombstones, and for smashing windows. Also, at the end of each delivery, you are awarded 250 points for each house you successfully deliver to. If you deliver to all the houses, then you have made a "perfect run" and you get 500 points for each house. Your accumulated bonus, or breakage points, are added to your score at the end of each day's delivery. Also, bonus men are awarded every 20,000 points.

Your delivery is not an easy task at all. There are many obstacles that get in the way, such as potholes in the sidewalk, people on the sidewalks (some are throwing boomerangs), fences, holes and cars. In the later screens, you encounter running dogs and remote-controlled mini-cars. If you purchase this game, don't expect to get past the first screen the first week you have it. This game is not easy!

Paper Route has a pause function and a high-score board, which is erased each time you turn the computer off.

A slight problem with this game is the sound effects. However, I enjoyed it from the day I opened the package, and I highly recommend *Paper Route* for all CoCo game players. Diecom knows what it's doing.

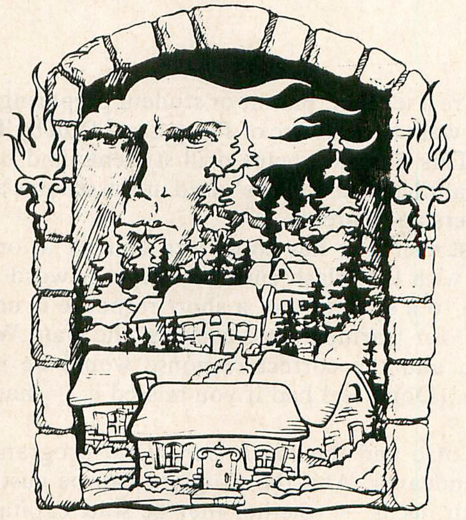
(Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8, tape or disk, $28.95, $38.95 Cnd.)

— Pat Downard

DON'T MISS THE FUN
DON'T MISS THE INFORMATION
Make plans now for
RAINBOWfest Chicago
and we'll see you at the
Hyatt Regency Woodfield on
April 10-12
The excitement's just begun!

Introducing...

White Fire
Of Eternity



White Fire is a full 64K super animated graphic adventure. In an age of magic and monsters, you are lost in the forbidden woods trying to get out...

Disk $24.95

CGP-220
Screen Dump

A graphics screen dump utility for the CGP-220 Ink Jet Printer. Features include: Fast machine language, four-color and one-color versions, special CoCo Max version, user selectable colors, regular or double-size printout. 16K

Tape $14.95 Disk $17.95

5.25 SSDD for only .85 ea.
Quality Media • Hub Rings
Write Protect Tabs • Tyvec Env.
Save! Order 60+ .80 ea.

Adventure In
Mythology
By Scott Cabit

An animated graphics adventure. Battle monsters and discover treasures as you assume the personalities of various heroes in ancient Greek mythology! Your goal is to win the hand of the beautiful Atalanta, the swift-running huntress. But beware of the perils and obstacles that stand in your way as you journey through ancient Greece! Four-voice music and sound effects, auto-matic speech when using a Tandy SSC speech pak. Load and Save feature. Over 250 locations. 64k machine lan-guage

Tape $21.95 Disk $24.95

More Great Software!!!!

Eagle Lunar Lander 32K	**$21.95***
Marooned! Graphic Adventure, 32K Disk	**$24.95**
Blackjack Dealer With Feeler Dealer, 32K	**$21.95***
Alpha 40+ Formats 40+ Tracks, 32K Disk.	*$19.95*
Maycode 6809 Disassembler, 32K	**$21.95***
Menu Maker ML Utility, 32K Disk	**$19.95**
Hires+ Screen Enhancer, 16K Tape	**$19.95**
64K Print Spooler 64K Tape	**$9.95**

**Add $3.00 For Disk*

Saguaro Software

4137 E. Bermuda
Tucson, AZ 85712
(602) 881-6786

Add $2.00 for Shipping • C.O.D. Order Add $3.00
Arizona Residents Add 7% Tax • Dealer Inquires Invited
Call Or Write For Free Catalog!
Authors- We're Seeking Good Software Now!

Facilitate Learning With *Flash Card Drill*

If you're a teacher, parent or student preparing for a test, you may want to be aware of *Flash Card Drill* by Thompson House. This program helps drill students and others, just like the familiar "flash cards" used in classrooms and homes by teachers and parents.

Almost everyone has come into contact at one time or another with the "flash card" concept. A word or picture is shown to a student and a short response is needed. For example, for learning state capitals, the state Washington is shown and the correct response would be its capital, Olympia. (Don't feel bad if you missed it — that's a tricky one!)

The CoCo and the *Flash Card Drill* program can help in this endeavor. And the program can be customized to meet your needs — whether they be state capitals, foreign language words or any other topic that needs short responses such as a flash card calls for. Being a math teacher, I found that it also generates math flash card lessons such as addition and multiplication facts.

Flash Card Drill is on disk and consists of two specific programs — FLASH/BAS and FCD/BAS. With these core programs, separate data files for various flash card types can be generated and saved for further use.

Unfortunately, no other documentation is sent with the disk. Thompson House could help immensely by providing start-up instructions and perhaps taking the user through a sample session.

To start *Flash Card Drill*, type `RUN"FLASH"`. A title screen appears and then the program automatically runs FCD/BAS.

At this point, there is a prompt for whether teacher instructions are needed. The instructions given on the screen prompt the teacher through a process to develop a practice lesson to be run by the student.

The main menu consists of three options: Teacher Menu, Student Menu and Run a Program. The Teacher Menu allows composing lessons, saving lessons and an option to return to the main menu. The Student Menu allows the user to make his own lesson, load a previously-saved lesson, load a lesson consisting of errors from a previous session or run a program.

When the user begins to compose a lesson, one drawback is immediately apparent. *Flash Card Drill* uses the CoCo's graphics screen display, and because of this and the size of the characters produced by the program, the length of the questions and answers is limited to a maximum of 12 characters. This is fine for many purposes, but being a teacher, I found it a little restrictive. However, since the flash card concept usually involves very short responses, this may not be a problem for many users. This drawback is not a fault of the program, but simply the result of using the graphics display screen with the large characters developed for the program.

Up to 30 questions and answers can be entered per lesson, a reasonable number to work with during a session. After entering your desired questions and answers, an edit feature is built in, which helps perfect and correct your lessons. They can then be saved on tape or disk.

The flash card lesson itself consists of a graphics screen with general instructions such as `Give answer`, `Name capital` or any other desired directions, along with the questions. The questions can be displayed either randomly, or in the order they were entered.

As you progress through the lesson, a scorecard of the number of correct responses is given at the bottom of the screen. If an incorrect response is given by the student or child, the same question appears again and again until the correct response is entered. This can be a very frustrating experience for the user. It would be better if, after a predetermined number of incorrect responses, the correct response were provided and a new question displayed. If the student does get stuck on a question, he can press the slash key (/) to move on to the next question, but this does not help him learn what the correct response was.

The sessions consist of at least 10 questions, even if your initial set-up had less than 10 questions. (The questions are repeated until at least 10 questions have been asked.) If you have a file of more than 10 questions, then 30 questions are asked, with some of them repeated, until 30 questions have been presented. Remember that a maximum of 30 questions is possible with *Flash Card Drill.*

After a session, the user is given a listing of the missed questions and answers. This error trapping is useful for both student and teacher, since feedback is a necessary part of the educational process.

After viewing the missed questions and answers, an option is given to either save errors or continue to practice. There is no option to end the session or return to the main menu at this point, which is another choice that should be offered to the user.

The Save Errors option enables the user to save the missed problems on disk, tape or printer. The printer option produces a nicely formatted "report card" of missed questions and answers.

In summary, *Flash Card Drill* is an educational program for the CoCo that is simple to use by teacher, parent, student or child. It enables lessons to be composed by the teacher, or even by the student, in a relatively easy way. Lessons can be saved and then loaded for further use, and the program is error-trapped for convenience and feedback. It can be used for words, short phrases and math problem flash card generation.

Flash Card Drill is definitely worth a place in many educational and home environments. If you're a teacher or parent who likes to customize lessons for your class or child, then *Flash Card Drill* is a program you may want in your software library.

(Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, 32K disk, $22.95)

— Donald A. Turowski

CyberTank Won't Let You Go

To tell the truth, when I first realized I was to review a game, I was somewhat disappointed. It seems that most games I've run across become uninteresting and even annoying after several plays. If you are one of the many people who feel the same way, I think you will be in for a pleasant surprise with *CyberTank* from Mark Data Products.

CyberTank is a Simulation in which you find yourself in a futuristic tank besieged by Autonomous Land Vehicles (ALVs), which are actually four different types of enemy tanks with varied armaments and capabilities.

You, of course, are not left defenseless. Along with a nonrenewable shield, you have many types of weapons at your disposal, including B-1 stealth plating, radar, cannon and rockets. However, you only have a limited supply and must use them judiciously lest you become destroyed before you can re-supply.

One of the things that makes the game interesting is that you must be, in effect, three people: the gunner, the loader and the commander. You have a separate screen for each one; when and how well you change screens can affect how long you stay alive.

The gunner's screen is where you will spend most of your time while in combat. (See Figure 1.) From here you aim and fire on the enemy. You have a small radar indicator, so you know from which direction you are being attacked. You also have fuel and shield gauges.

The loader's screen is where you decide what type of weapon and munitions to use and make them ready to use. You also access the supply depot from here.

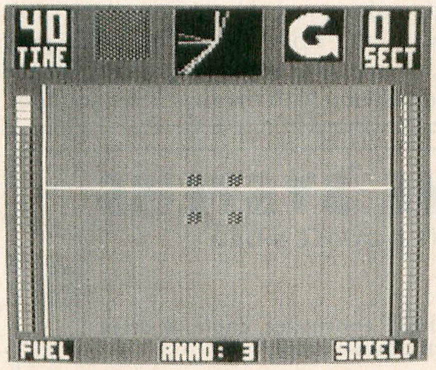


Figure 1: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

The last screen, the commander's screen, is a cumulative radar map of the sector you are in currently. (See Figure 2.) The effectiveness of your radar screen is determined by equipment used by the loader.

a small number of weapons to call upon. However, as you progress to different sectors via the teleport device you pick up at the munitions depot, you accumulate more and deadlier weapons.

The documentation mentions no ultimate goal other than to kill the enemy and stay alive, and I didn't find a way to finally win. But to be fair, I only got as far as Sector 7, so I don't know what happens in later sectors.

The program comes in a nice, black vinyl book, is on a copy-protected disk and has six pages of documentation. To use *CyberTank* you need 64K and one disk drive. Joysticks are not necessary.

The main complaint I have with *CyberTank* is the lack of understandable documents. The reference manual makes sense *after* you've figured out how to play the game, but doesn't help much the first few times you play.

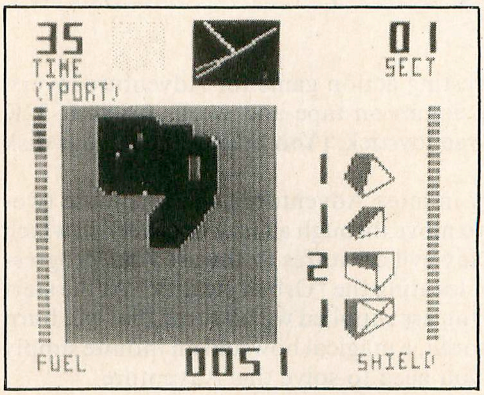


Figure 2: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

To sum up, *CyberTank* takes good strategy and quick hands to survive, and I've had many enjoyable late night marathons with it. Hopefully, the documentation will be rewritten; in spite of that, I highly recommend *CyberTank*, especially to all of you who have become bored with games.

(Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, disk only, $27.95.)

— Bill Tottingham

YORK 10®
CASSETTES

COMPUTER GRADE
• DATA TRAC •
BLANK CASSETTES
C-05, C-06, C-10, C-12, C-20, C-24, C-32

BUY THE BEST, AT FACTORY-DIRECT PRICES

From the leading supplier of Computer Cassettes, new, longer length C-12's (6 minutes per side) provide the extra few feet needed for some 16K programs.

- BASF-LHD (DPS) world standard tape.
- Premium 5 screw shell with leader.
- Internationally acclaimed. Thousands of repeat users.
- Error Free • Money back guarantee.

✱ 500 C-12's or C-10's — 38¢ each
w/labels, add 4¢ • Shipping $17/500
500 Boxes 13¢ ea • Shipping $10/500
(Free Caddy offer does not apply)

TRACTOR FEED • DIE-CUT
BLANK CASSETTE LABELS
WHITE $3.00/100 $20.00/1000
NEW COLORED LABELS • Pastels · Red, Blue, Green, Yellow, Lavender
$4.00/100 $30.00/1000

CASSETTE STORAGE CADDY
Holds 12 cassettes $2.95
w/o boxes
Includes edge labels and index card

FREE
1 CADDY WITH EVERY
4 DOZ. CASSETTES PURCHASED
(does not apply to 500 quantity offer)

Call: 818/700-0330
FOR IMMEDIATE DELIVERY
on Credit Card Orders.

ORDER NOW . . . MAIL TO –
YORK 10
9525 Vassar Ave. #R1
Chatsworth, CA 91311

ORDER FORM

ITEM	1 DOZEN	2 DOZEN	TOTAL
C-05	☐ 7.00	☐ 13.00	
C-06	☐ 7.00	☐ 13.00	
C-10	☐ 7.50	☐ 14.00	
C-12	☐ 7.50	☐ 14.00	
C-20	☐ 8.75	☐ 16.50	
C-24	☐ 9.00	☐ 17.00	
C-32	☐ 11.00	☐ 21.00	
Hard Box	☐ 2.50	☐ 4.00	
Wht. Labels	☐ 3.00/100	☐ 20.00/1000	
Color Labels Color ____	☐ 4.00/100	☐ 30.00/1000	
Storage Caddy @ 2.95 ea Qty			
SUB TOTAL			
Calif. residents add sales tax			
Shipping/handling			3.50
Outside 48 Continental States — Additional $1 per caddy, per doz. cassettes or boxes			
TOTAL			

#R1
Each cassette includes 2 labels only. Boxes sold separately. In Continental U.S. shipment by U.P.S. If Parcel Post preferred, check here. ☐

Check or M.O. enclosed ☐ Send Quantity Discounts ☐
Charge to credit card: VISA ☐ MASTERCARD ☐

Card No. ____________ Exp. ______

Name ____________

Address ____________

City ____________ State/Zip ______

Signature ____________ Phone ______

Ask about our DUPLICATING SERVICE

Magic and Mystery Surround *The Quest for Reality*

Here is an interesting action game for Adventure lovers. *Quest for Reality* comes on tape and works on your 32K ECB CoCo with one joystick. (You must remove your disk controller.)

As is customary in most Adventure games, you use two-word commands to move through a maze or cavern in which you encounter many evil creatures to thwart your progress toward the goal of locating the "Orb of Reality." At the start of the Adventure you are supplied with a torch that will burn for eternity. This torch, a magical bow and an infinite supply of arrows are all you need to solve this Adventure.

You press `N`, `S`, `E` or `W` to move about the caverns in which you have been placed by a mysterious being. The creatures you encounter soon drain your strength, so you must align the small, square bow sight over your target and fire quickly. The creature's strength can be measured during your battle by the vertical line next to the combat screen. As the creature's strength decreases, so does the line.

There is also a MAP command you can use to orient yourself, but I found it to be of little help because of its small size. As in most Adventures, you also have to gather items to assist you in your quest.

While this Adventure is OK, it's not great. *Quest for Reality* is fun and will keep your interest for a while, but eventually the action becomes predictable. I did like the moving eyeball that frequently appeared in the text screen as if to watch my next move! I enjoy Adventures and I'd rank this one above average.

(Brainbank Software, Rt.2 Box 1015, Friendsville, TN 37737, $21.95 plus $1.50 S/H)

— David Gerald

Add a Second Disk Drive In Minutes With Drive 1 Upgrade

Here is a project that will not only upgrade your present single-drive system to two drives, but will save you money at the same time. Although the upgrade does require breaking the warranty seal on your Radio Shack Drive 0, the process is simple and quick. And best of all, you will be proud that you did it yourself.

Drive 1 Upgrade is a single-sided, half-height TEC FB-501 drive that takes just minutes to mount in your Radio Shack FD-501 Color Thinline Disk #0 Cabinet (RS #26-3131). The only tool required is a Phillips head screwdriver. The seven necessary steps are explained in an easy-to-understand installation sheet that comes with the well-packaged disk drive.

After turning off the computer and unplugging the disk drive, simply unplug the ribbon cable from the rear of your existing Drive 0. Then remove the six screws (three on each side) that hold the top of the drive case to the bottom. After taking off the top cover, remove the black plastic cover on the front of the drive above Drive 0. This cover will no longer be needed.

Next, mount the new Drive 1 above Drive 0 onto the brackets extending from Drive 0. Four screws for this are provided with the new drive. Now the power connection is made. A white connector with four wires (yellow, white, black and red) is plugged into the mating connector on the Drive 1 circuit board. It will only go in one way, so don't worry about putting it in wrong. The flat ribbon cable supplied with your Drive 0 has a second connector that up to now was not being used. Simply plug this gray connector onto the circuit board, making sure the red line on the cable is facing the outside of the drive case. The other gray connector connects to Drive 0 as it did originally. Put the top cover back on and fasten it with the six screws you took

PRINTERS!!!

NEW! Star Micronics NX-10	$295
Okidata 192 (Parallel)	$370
Okidata 192 (Serial)	$425
Okidata 182	$240
Silver Reed 550 (Daisy Wheel)	$395
Silver Reed 400 (Daisy Wheel)(Par. or Serial)	$200

Other Printers, Monitors, and Accessories for CoCo and IBM upon request.
$15 off interface with purchase of printer.
Find your cheapest published price and we'll beat it!!!

SP-2 INTERFACE for EPSON PRINTERS:
- 300-19,200 BAUD rates
- Fits inside printer — No AC Plugs
- Optional external switch ($5.00 extra) frees parallel port for use with other computers
- $49.95 (plus $3.00 shipping)

SP-3 INTERFACE for MOST OTHER PRINTERS:
- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables
- $64.95 (plus $3.00 shipping)

Both also available for IBM, RS-232 and Apple IIC computers.

DISK DRIVE SYSTEMS

ALL ½ HEIGHT DOUBLE SIDED

Drive 0 (addressed as 2 drives!)	$235
Drive 0,1 (addressed as 4 drives!)	$350

All above complete with HDS controller, cable, & drive in case with power supply

Bare Double Sided Drives	$109
Dual ½ Height Case w/Power Supply	$49
Double Sided Adapter	$25
HDS Controller, RS ROM & Instructions	$99
25 CDC DS/DD Diskettes	$32 & $3 s/h

We use the HDS controller exclusively. Can use 2 different DOS ROM's.
Shipping Costs: $5/drive or power supply, **$10** max.
Co Co Serial Cables 15 ft.—**$10.** Co Co/RS-232 Cables 15 ft.—**$20.**
Other cables on request. (Add $3.00 shipping)

CNR ENGINEERING
P.O. Box 293
Raritan, NJ 08869
(201) 722-1055

lot easier for programmers. With OS-9 Level II the limited memory problems all but disappear and the new windowing environment makes programming point-and-click software much easier.

So, what would we like to see in our software Christmas stocking next Christmas? Let's dream.

Since OS-9 Level II is made for multitasking and multi-view makes windowing a snap, maybe someone will come up with a management tool like this for OS-9. Think about the possiblities: In one window you can access your rolodex with a click of the mouse. Select a name, click the mouse again and dial the phone. While you are on the phone you can study your "to do" list in another window. Or, open a document window under one of your headlines and take notes from the call. If you want to keep a record of your calls for billing purposes, you can use the program's date and time stamp to put the time at the beginning and end of the notes from the call. When you hang up, click on another window and you can look at your calendar. Select the amount of time in each segment of your day and push another button and *More* creates a subheadline for each period of the day. At this point you only need to add your own assignments or meeting notes.

What else can you do? Select a section of your outline and pick an option from a pull-down menu and it instantly prints a bullet chart you can print directly on an overhead transparency. If you would rather have things printed in neat little boxes, make another menu selection and a neatly formatted organization chart pops onto your screen.

What about the items in your "to do" list that require you to write a letter or memo? Do you need to quit the program and start up a word processing program? No! You simply click twice on a marker in front of your headline and a text window opens and you can create a document of any length. Of course, you can also put a document containing graphics under a headline. Finally, all or any part of your outline can be exported to any other word processing program.

This is advanced idea processing combined with desktop publishing. I can't wait to run it on the new CoCo 3.

UNIX Comments From Kevin Kuehl

Kevin Kuehl of Valparaiso, Indiana, has contributed many excellent programs to these pages. Recently, after we published a description of Brian Lantz's *KShell*, Kuehl wrote to let us know that the quote expansion feature Brian added was not pure UNIX. In fact, he quoted from a paper and book by Steven Bourne, author of the famous *Bourne Shell*.

"There are three quoting systems used on UNIX systems, the single quote, the double quote and the escape character," Bourne wrote. "The single quote transfers whatever is inside the pair verbatim to the program. The double quote transfers everything but single quotes and escape characters. The escape character transfers the next single character to the program."

Kuehl, calling for correct information about UNIX in RAINBOW also gave examples from a book named *The UNIX System*:

```
echo \?yields?
echo \\yields\
echo xx'***'xx
  yieldsxx***xx
echo The date is 'date'
.yieldsThe date is date.
```

Complete Rainbow Guide to OS-9 Brings Hackers Together

Kevin Darling has sent us a great story from North Carolina. It seems that Steve Croom was having problems with his hard disk drive. When Darling found out that Croom, a Navy man stationed on the West Coast, was from North Carolina, too, and was planning to come home on leave soon, he suggested that Croom bring the drive and he would try to fix it.

"As I prepared to leave for the airport I realized we had no idea of what each other looked like," Darling said. Trying to think of an identifying object, I grabbed *The Complete Rainbow Guide to OS-9* on the way out. When I reached the arrival gate, I simply sat down and laid the book on the table next to me. Sure enough, Steve spotted the book.

"We still can't believe that we never met before, except on the OS-9 SIG, and he gave me a $700 hard disk drive on faith. The only ID he ever saw from me at the airport was *The Complete Rainbow Guide to OS-9*."

We also received a short thank you note from Eric W. Tilenius. We mentioned several months ago that he was looking for some talented programmers.

"Thanks to you, I've been in touch with some very talented and interesting people," Tilenius said. He promised us one of the very first copies of *Print Shop* when it comes out. Should be fun!

Databases Are Gold Mines

Since we're talking about telecommunicating, here's a tip. The databases managed by the many Special Interest Groups (SIGs) on most of the commercial services are a gold mine. For example, the OS-9 section on RAINBOW's CoCo SIG on Delphi is really beginning to take shape.

Check out Steve Bjork's fantastic bouncing ball demo program. You'll have a fantastic demo to show off your Color Computer if you download the binary code. And, if you download the source code, you'll see how Steve makes magic with graphics and animation. If you need a good screen-oriented editor, download the *Dolphin Technology Text Processing System* from the CoCo SIG's OS-9 database. It's written in C and has many machine language routines to speed up crucial sections of the program. If you contribute more than $20 to the author you'll receive Version 2.00 of this editor. Version 2.00 has been expanded and includes merge, block duplicate, printer output and display memory, as well as search and replace features.

OS-9 Level II Program Development System Has Screen Editor

When you buy OS-9 Level II for $79.95, you get BASIC09 with it. Now that's a bargain for high level language programmers.

There is also a program development system available that features a screen editor, assembler and linker.

The screen editor is the SCRED editor that has been available for other OS-9 Level II and 68000 systems for several years.

SCRED is straightforward and easy to use. It can be used to create or modify any text file. It lets you do either line or character oriented editing.

SCRED has three modes, Command, Edit and Insert. A set of commands is available in both the Command and Edit modes. The top line of the terminal displays the line number your cursor is on, the column number, the name of the file being edited, the amount of space left in your buffer and the mode you are working in. If your file is larger than the memory buffer used by SCRED, simply issue the (More) command when you want to write out the section of text you are working on and read in another. SCRED displays 80 characters on the

KISSable OS-9

Looking At Blue Sky For OS-9 Level II

By Dale L. Puckett
Rainbow Contributing Editor

It's been a long wait — but well worth it. The new Color Computer 3 is simply *outstanding*. The graphics knock your socks off. With the new windowing capability that is now a part of OS-9 Level II and the promised *Multi-View* visual shell, we should see some really super software soon.

It's Time for Frank to UnFLEX His Bias

As I stared at the outstanding resolution, bright colors and amazing animation on the new Color Computer 3's screen, I couldn't help but remember the debate we had with Frank Hogg in the May 1984 issue of THE RAINBOW. Here's a sample from Frank's article titled, "On OS-9 Matters, Frank FLEXes His Bias."

"First, Tandy did not do a pure OS-9. Close, but not pure. The disk driver will only support single-sided drives and at the maximum, only 40 tracks. To put BASIC09 on the system disk, you have to delete files; otherwise it won't fit. A single-drive user is plumb out of luck. You can't change the stepping speed of the drives either. So, if you have drives better than Tandy's, you will not be able to utilize the extra speed.

"Second, Tandy does not provide a Hi-Res screen with OS-9. You are left to work with the pathetic 16 by 32, uppercase only screen . . . ."

I debated Frank then because we were already publishing articles that told how to work around the limited disk size and upgrade the performance of OS-9 on the CoCo. Level I OS-9 on the original Color Computer 2 was and is a bargain. Level II OS-9 on the Color Computer 3 is a steal.

It's time for Frank to unflex his bias. Tandy has listened to us and eliminated many of our complaints. For example, the disk drivers in OS-9 Level II read information about the physical configuration of your disk drives from the device descriptors like they're supposed to. There is now a Hi-Res screen. In fact, with the new windowing capability of OS-9 Level II, we can view our text on 24 80-character lines and create several windows onscreen containing high resolution graphics or additional text. Since OS-9 is multi-tasking we can have the output from a different task going to each of these windows. The promised *Multi-View* shell makes the windowing features so easy to use that anyone can use them.

Volkswriter Deluxe for OS-9

On the OS-9 68000 scene, MicroTRENDS has announced that *Volkswriter Deluxe* is being ported to OS-9. The program was named the best of 1984 by the editors of *PC Magazine*. It is fast, reliable and easy to use. All commands are logical and concise, requiring the fewest keystrokes per function of any word processor.

Volkswriter Deluxe OS-9 features text merge, note pad, horizontal scrolling, multi fonts, expanded document size, unlimited moves, onscreen tutorial and help keys, special characters and printer installation. It runs on the MicroTRENDS 68000 Jonathan card that plugs into the Apple II.

If this program is written in a high level language maybe the folks at MicroTRENDS will convince Lifetree Software to move it on to the new Color Computer 3. We can only hope.

During his address to the OS-9 Users Group Community Buffet at RAINBOWfest Palo Alto, Computerware's Paul Searby called on software developers "to set as a priority the task of making OS-9 on the CoCo more user friendly." At the time he praised Tandy for releasing products like *Deskmate, Micro Illustrator, OS-9 Profile* and *Robot Odyssey.* He also put his money where his mouth is by supporting Mike Bailey's *The Last Word.*

The great news is that the new Color Computer 3 is going to make it a whole

---

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.*

to the current program counter location plus $39, location $442. This location is in the screen area and has been filled with a $39 previously. The $39 is executed as an RTS instruction which causes a return to the BASIC program. The "DONE!" message is then displayed at the screen start. All of which goes to prove that video memory is simply computer memory after all!

11) The annotated code for this problem is:

```
        LDX     #0       clear count of men=women
        CLR     CNT      clear 255 to 0 value
LOOP1   CLRB               clear count of 1s (men)
        DEC     CNT        get next value
        LDA     CNT
        BEQ     OUT        go if 256 times
LOOP2   LSLA                 shift out next bit of 8
        BCC     NEXT1        go if 0 (woman)
        INCB                 bump count of men
        TSTA                 set CC
        BEQ     FIN          stop if no more 1s (men)
NEXT1   BRA     LOOP2        loop, counting men
FIN     CMPB    #4         4 men counted?
        BNE     NEXT2      go if not
        LEAX    1,X        bump count of men=women
NEXT2   BRA     LOOP1      continue for 256 permut'ns
OUT     RTS              return
CNT     RMB     1        count of 255 to 0
```

This code determines the probability that the number of men will equal the number of women. A probability of one means that the number of men will *always* equal the number of women. A probability of zero means that the number of men will *never* equal the number of women. The probability here is obviously somewhere in between.

In this problem there are eight users at a table. We're not told whether they are men or women. If we let each bit of a byte represent an individual user, however, we can use the assembly language subroutine to figure out the probability. Men are represented by a 1 bit while women are represented by a 0 bit. Let's try a simpler case first. Suppose that there are only four users at a table. The possible permutations are:

```
0000  4 women
0001  3 women, 1 man
0010  3 women, 1 man
0011  2 women, 2 men
0100  3 women, 1 man
0101  2 women, 2 men
0110  2 women, 2 men
0111  1 woman, 3 men
1000  3 women, 1 man
1001  2 women, 2 men
1010  2 women, 2 men
1011  1 woman, 3 men
1100  2 women, 2 men
1101  1 woman, 3 men
1110  1 woman, 3 men
1111  4 men
```

The probability here is the number of times that men equal women divided by the total number of cases, or 6/16 + 3/8 + .375.

You can see that the number of times women equal men can be computed by generating the binary numbers from zero to 15 and then counting the number of cases where there are two ones. The same thing can be done for a group of eight users (or any size group). The previous code generates the binary numbers from 00000000 through 11111111 and then counts the cases where the number of ones is four. The result is 70/256, or a probability of .273 that the number of male CoCo users will equal the number of female CoCo users. This little program is great for those Color Computer social gatherings.

12) I'll bet you forgot about the obscure ABX instruction! This instruction takes the contents of B, treated as an unsigned number, and adds it to the X Register, with the result going into X. This is a handy way to increment the X Index Register when it is used as a pointer, which it often is.

Pi Revisited

The column on generating pi drew a lot of interest from readers. First to respond was Carey Bloodworth of Swink, Okla., who noted a more efficient way to generate pi and informed me that his program ran three times as fast as the one in the column. (At that point I had produced a program that was twice as fast as the one appearing in the column, but Carey's sounds faster). If you're interested in this problem, contact Carey at P.O. Box 17, Swink, OK 74761.

Andre Needham of Renton, Wash. sent a pi formula that converges much faster. He also noted that he has memorized pi to 42 places. Bruce Arsenault of Nova Scotia also sent a long letter detailing a faster algorithm.

Michael Frank, 4515 Oak Hill Road A-5, Chattanooga, TN 37416, sent a program that calculates 1000 digits of pi in six minutes by an efficient divide routine. Sounds like Carey and Michael should communicate.

Edward Freeman Yendall of North Fort Meyers, Fla., sent a fascinating letter describing computer processing of a special form of prime numbers called Mersenne primes. His original work (he included a printout) was done in the 1950s on a Burroughs Datatron computer! Edward has now duplicated the work on the CoCo.

If enough readers are interested in problems of this sort, I'd be happy to oblige you in future columns. Let me and RAINBOW know.

Next month, I'll be back with more CoCo assembly language topics. Till then, keep assembling.

OS-9™ SOFTWARE/HARDWARE

SDISK—Standard disk driver module allows the full use of 35, 40 or 80 track double sided disk drives with COCO OS-9 plus you can read/write/format the OS-9 formats used by other OS-9 systems. (Note: you can read 35 or 40 track disks on an 80 track drive). Now updated for OS-9 ver. 02.00.00 **$29.95**

SDISK + BOOTFIX—As above plus boot directly from a double sided diskette **$35.95**

L1 UTILITY PAK—Contains all programs from Filter Kits Nos. 1 & 2 plus Hacker's Kit #, plus several additional programs, Over 35 utilities including "wild card" file cmds, MacGen command language, disassembler, disk sector edit and others. Very useful, many of these you will find yourself using every time you run your system. These sold separately for over $85. **$49.95**

SKIO—Hi res screen driver for 24 x 51 display; does key click, boldface, italics; supports upgraded keyboards and mouse. With graphics screen dump and other useful programs. **Now UPDATED FOR OS-9 Ver 2.0 $29.95**

PC-XFER UTILITIES— Utilities to read/write and format ss MS-DOS™ diskettes on CoCo under OS-9. **$45.00 (requires SDISK)**

CCRD 512K Byte RAM DISK CARTRIDGE—Requires RS Multipak interface, two units may be used together for 1MB RAM disk. OS-9 driver and test software included. **$199.00**

All disk prices are for CoCo OS-9 format; for other formats, specify and add $2.00 each. Order prepaid or COD, VISA/MC accepted, add $1.50 S&H for software, $5.00 for CCRD; actual charges added for COD.

D.P. Johnson, 7655 S.W. Cedarcrest St.
Portland, OR 97223 (503) 244-8152

(For best service call between 9-11 AM Pacific Time)

OS-9 is a trademark of Microware and Motorola Inc.
MS-DOS is a trademark of Microsoft, Inc.

7) Sorry, I just couldn't resist this one. Admittedly, this application has limited use. However, the code is:

```
        ADDA      #1       bump by one
        DAA                decimal adjust
```

The DAA instruction is one you may never have used. It is a "decimal adjust" that allows BCD, or binary-coded-decimal operations. In BCD, the decimal digits of zero through nine are coded in each four bits. Each four-bit chunk, called a "nibble" or "nybble," can only contain values of 00000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, or 1001, and cannot contain the values 1010, 1011, 1100, 1101, 1110, and 1111. The DAA is used after an add or subtract to adjust the binary add back to proper BCD form. If this were not done, the add:

```
        00011001   (19 in bcd)
       +00110101   (35 in bcd)
        --------

   would result in

        00011001   (19 in bcd)
       +00110101   (35 in bcd)
        --------
        01001110   (not 54 in bcd!)

   instead of

        00011001   (19 in bcd)
       +00110101   (35 in bcd)
        --------
        01010100   (54 in bcd)
```

The adjustment is made by adding +6 to either or both nibbles. In the problem here, the DAA causes the adjustment of the least significant nibble if the result is 10 to 16.

8) The answer is a snap if you know your shifts:

```
        ASRA               divide by 2
        ASRA               divide by 4
        ASRA               divide by 8
```

As you probably know, shifting right by one bit divides by two, by two bits divides by four, and so forth. Dividing by any power of two can be done by the appropriate number of right shifts. However, if the number to be shifted is a signed, two's complement number, a logical shift (LSR, LSL, etc.) won't work. The two's complement number -100 is 10011100. Shifting right one bit logical results in 01001110, or a value of +80. However, shifting right one bit arithmetic results in the correct result of 11001110, a value of -50.

If the value cannot be evenly divisible by a power of two, a negative result is sometimes rounded down by one. The number -105 in two's complement form is 10010111; shifting right arithmetic results in 11001011, or -53.

9) The code here is a bubble sort that sorts the data in buffer into ascending order. Values of 23, 56, 1, 3 and 17, for example, would be sorted into 1, 3, 17, 23 and 56. The bubble sort is a simple sort, but not very fast. Here's the annotated code:

```
LOOP1  LDY     #0        load "swap" flag
       LDX     #BUFFER   point to start
LOOP2  LDD     ,X+         get two entries, and bump
       CMPA    ,X          compare pair
       BLO     NEXT        go if in order
       LDY     #1          set swap flag
       EXG     A,B         exchage the two
       STD     -1,X        store swapped pair
NEXT   CMPX    #BUFEND     at end
       BNE     LOOP2       go if not at end
       LEAY    -1,Y      test for swap
       BEQ     LOOP1     go if still unsorted
```

The bubble sort compares two entries at a time, starting from the top of the table. (See Figure 2.) If the second entry is less than the first, the two bytes are swapped and a "swap flag" is set to one. One complete pass is made through the table and the swap flag is checked. If at least one swap occurred, another pass is made. This process continues until no swaps have been made, indicating that the data is sorted in numerical order. The LEAY -1,Y above is a tricky way to test that Y contains a one. If Y contains a one, a zero results after the LEAY and the zero condition code is set, otherwise the zero condition code is not set.

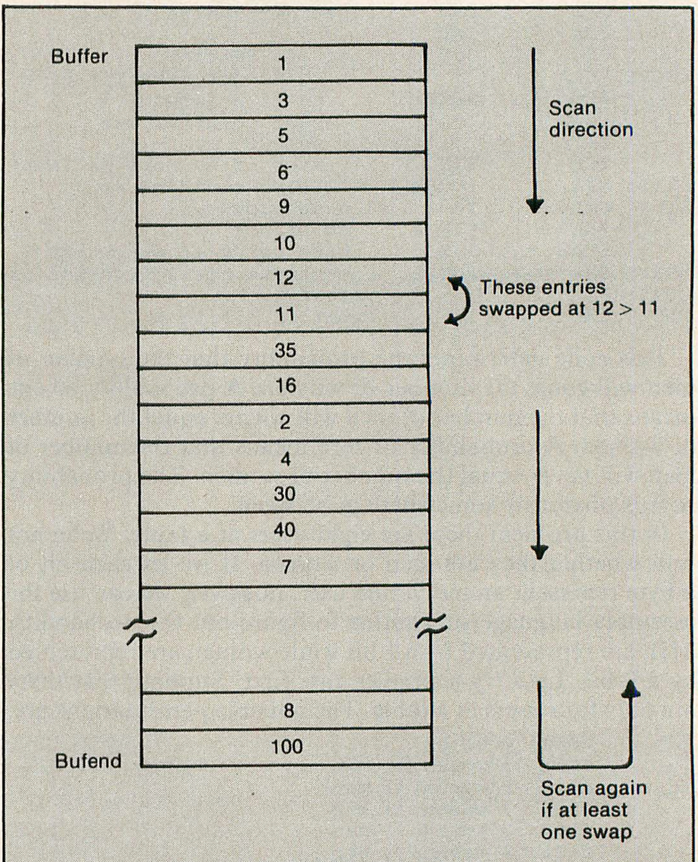

Buffer
1
3
5
6
9
10
12
11
35
16
2
4
30
40
7
8
100
Bufend
Scan direction
These entries swapped at 12 > 11
Scan again if at least one swap

Figure 2: Bubble Sort Action

10) There's no reason why assembly language code can't be located in the text screen area. Of course, it has a tendency to be destroyed by data displayed on the screen! This subroutine can be relocated to the screen by a BASIC program as follows:

```
100 DATA &H86,&H39,&H8E,&H06,&H00,&HA7,&H82,&H20,&HFC
110 CLS
120 FOR I=&H400 to &H400+8
130 READ A: POKE I,A
140 NEXT I
150 DEFUSR0=&H400
160 A=USR0(0)
170 PRINT "DONE!";
180 GOTO 180
```

The subroutine is relocated to the first portion of the text screen. You'll see garbage characters fill up the first nine screen bytes. These garbage characters represent the machine language bytes of the assembly language program. The USR0 transfers control to the subroutine and it starts storing ASCII $39 characters to the text screen, starting from the screen end. An ASCII $39 is a "9" character, and therefore, nines start filling up the screen. When a $39 replaces the second byte of the BRA LOOP instruction, however, the branch is done

Still puzzled? This routine finds the square root to the next lowest integer of the number in OP. For example, if OP contained 41,000, the result in the U Register would be 202. The crux of the algorithm is the fact that the square root of a number is equal to the total number of odd integers in the number. The square of 100, for example, is 100 - 1 = 99 - 3 = 96 - 5 = 91 - 7 = 84 - 9 = 75 - 11 = 64 - 13 = 51 - 15 = 36 - 17 = 19 - 19 = 0. The number of odd integers is 10 — 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19.

4) The huge program that solves this problem is shown below:

```
SEX                        sign extend B into A
```

This instruction is one of the more interesting in the 6809 repertoire, but it does nothing more than "sign extend" the operand in B into the A Register. If the sign bit, Bit 7, of the B Register is zero (positive), zeroes are put into the A Register. If the sign of the B Register is one (negative), all ones are put into the A Register.

In case you're hazy about two's complement notation, remember that it's a way of expressing both positive and negative numbers. An eight-bit register can hold values of -128 through +127 in this format. Positive numbers have the sign bit set to zero and the number in bits 6 through 0 of the Register. A +100 would be 01100100, for example. Negative numbers have the sign bit set to one and the two's complement of the value in bits 6 through 0. A -100 would be 10011100.

Why SEX? Since 16-bits adds and subtracts, and other arithmetic processing is done in the D Register (A and B combined), it's a handy way to make a 16-bit signed number out of eight bits.

5) Some of the possible ways to load A with the contents of Location $3E00 are:

```
LDA  $3E00       extended addressing
LDA  -$1FF,X     indexed addressing
LDA  $40,Y       indexed addressing
LDA  $3E00       direct page addressing
LDA  B,Y         accumulator offset addressing
LDA  $3E00,PCR program counter relative addr
```

A dark horse candidate is:

```
LDD  $3E00
```

which loads A, but also clobbers the contents of the B register.

The extended addressing mode specifies the memory address in the last two bytes of the three-byte instruction. The indexed X-addressing example adds the contents of the X Register, $3FFF and -$1FF to get the effective address of $3E00 before the load is done. The indexed Y addressing adds $3DC0 in Y to $40 to get the same effective address. The direct page addressing example computes the effective address by using the contents of DP as the upper eight bits of the address and the second byte of the instruction — $3E, $00 in this case. The accumulator offset adds the contents of index Register Y and the contents of B. The PCR example puts an offset of -$104 in the last two bytes of the four-byte PCR instruction. The effective address is computed by adding the current contents of the program counter $3F04 (the start of the instruction after the LDA) to an offset of -$104 to get an effective address of $3E00.

That wasn't too bad, was it?

6) This problem isn't hard to follow if you write down the results. The X Register points to an open-ended buffer area as shown in Figure 1. Each entry in the buffer is made up of two bytes. Zero is put into the first entry and one into the next to initialize the subroutine. The FIBO loop adds the nth entry to the (n + 1) entry. The result is put into the (n + 2) entry. The pointer in X is then bumped by two. A BSR then calls the FIBO code again. Why the BSR instead of a BRA? No reason other than to demonstrate a simple case of recursion. The FIBO code is called repeatedly until the result is so large that overflow results. In this case the RTS is executed to return from the subroutine. Since there are many levels of BSRs at this point, each return is made to the first RTS repeatedly, much like peeling the layers of skin on an onion.

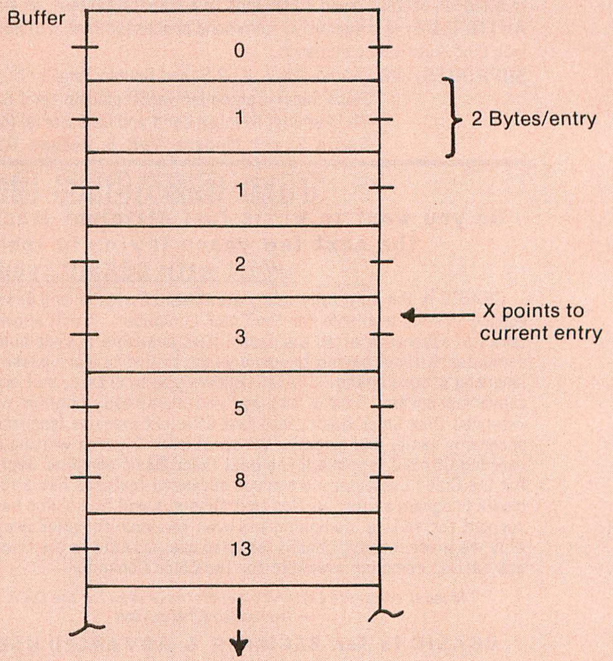


Figure 1: Fibonacci Buffer Area

The results in the buffer area look like this: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2504, 4181, 6765, 10946, 17711, 28657. Each term is computed as the sum of the two preceding it. This sequence is a famous mathematical sequence known as the Fibonacci series, with applications in diverse areas, including computer algorithms.

Overflow occurs when the 23rd term is reached with a result of 46,368. At this point, the stack is 23 levels deep and uses 46 bytes for return addresses! If you run this code, make certain you have enough room for the stack. The annotated code is:

```
FIBOS   LDX     #$BUFFER  start of buffer
        LDD     #0        initialize first term
        STD     ,X        in first 2 bytes
        LDD     #1        initialize 2nd term
        STD     +2,X      in second two bytes
FIBO    LDD     ,X          get nth term
        ADDD    +2,X        add nth+1
        BVS     OUT         go if too large
        STD     +4,X        store nth+2
        LEAX    +2,X        bump
        BSR     FIBO        call compute term
OUT     RTS               many happy returns
BUFFER  RMB     100
```

DataPack II Plus V4.0

SUPER SMART TERMINAL PROGRAM

With AUTOPILOT Executive Command Processor and AUTO-LOG Language Processor
X-MODEM DISK FILE TRANSFER SUPPORT
VT-100 & VT-52 TERMINAL EMULATION

- No lost data when using Hi-Res Display , Even at 1200 Baud.
- 9 Hi-Res Display formats, 28 to 255 columns by 24 lines.
- *True Upper* and Lower Case Displays.
- 45K Text Buffer when using the Hi-Res Display and Disk .
- Kill the Hi-Res Display Option for an Extra 6K of buffer space.
- ASCII & BINARY disk file transfer via XMODEM.
- Directly record receive data to a disk file while online.
- VT-100 terminal emulation for VAX, UNIX and other systems.
- VT-100/52 cursor keys & position, insert/delete, tabs & more.
- Automatic File Capture.
- Programmable Word Length, Parity and Stop Bits.
- Programmable Baud Rates from 300 to 19200 Baud.
- Complete Full and Half Duplex operation, no garbled data.
- Send full 128 character set from Keyboard with control codes.
- Freeze Display & Review Information On line with no data loss.
- Complete Editor, Insert, Delete, Change or Add to Buffer.
- Automatic Key Repeat for Buffer Editing.
- 9 Variable length, Programmable Macro Key buffers can store entire programs. Only limited by the size of available memory.
- Programmable Control Character Trapping.
- Programmable Prompt Character or Delay to send next line.
- Programmable Printer rates from 110 to 9600 Baud.
- Send Files directly from the Buffer or Disk.
- Supports True Line Break Transmission.
- Save and Load Text Buffer and Program Key to Tape or Disk.
- Disk Commands include: Load, Save, Kill and Directory.
- Display on Screen or Print the contents of the Bufferr.
- Automatic Memory Sense 16-64K (32K required for Hi-Res).
- Program and Memory Status Displays.
- Built in Command Menu (Help) Display.

Auto-Log: is a communications programming language that will enable you to automatically have DPII+ Dial the phone, wait for and respond to a log-on prompt, send commands to a remote system, or even to send an entire program automatically.

AUTOPILOT: is a executive command processor that will automatically process a command file containing a sequence of DPII+ commands including Auto-Log commands.

SUPPORTS: PBJ Word-Pak I, II, R.S. and Double Density 80 Column Cards
Disto Super Controller w/80 column card & parallel printer
PBJ Parallel Printer Card and Dual Serial Port (2SP-Pak)
Radio Shack Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Not Compatible with JDOS
Requires 32K & Disk
Only $59.00

The CBASIC Editor/Compiler V1.1.2

Do you want to write fast efficient machine language programs but you don't want to spend the next few years trying to learn how to write them in Assembly language?

Well with CBASIC, you could be writing them right now!

CBASIC is the only fully integrated Basic Compiler and program editing system available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your color computer without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Extended Disk Color Basic, into fast efficient machine language programs easily and quickly. We spent over 2 years writing and refining CBASIC to make it the Best Color Basic compiler available for the Color Computer. We added advanced features like a full blown program editor, Hi-Res text Displays and 80 column hardware support for editing, compiling and even for your compiled programs. Plus we made it exceptionally easy to use, CBASIC is the friendliest and easiest compiler available for the Color Computer.

"The most complete Editor/Compiler I have seen for the CoCo... "
--The RAINBOW, March 1986

CBASIC is for BEGINNER & ADVANCED USERS

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocation and so on, because CBASIC will handle it for you automatically. For Advanced users, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset and On Error handling, and much more.

Commands and Extensive Hardware Support

CBASIC features well over 100 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, including Graphics GET, PUT, PLAY and DRAW, all with 99.9% syntax compatibility. CBASIC also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with easy to use PRINT, INPUT and INKEY commands.

CBASIC is the only Color Basic Compiler that includes it's own Hi-Res 51, 64 or 85 by 24 line display. It also supports the PBJ "Word-Pak" I, II and R.S. versions as well as the Disto and Double Density 80 column displays. All as part of the standard CBASIC package. You can even include them in your compiled programs by using a single CBASIC command.

CBASIC makes full use of the power and flexibility of the 6883 SAM in the Color Computer. It will fully utilize the 96K of address space available in the CoCo during program Creation, Editing and Compilation. There is a single CBASIC command for automatic 64K RAM control, to allow use of the upper 32K of RAM automatically. When used in compiled programs it will automatically switch the ROMs and RAM in and out when needed. Plus there are two other commands to control of the upper 32K of RAM manually in a program.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs, most likely you'll find you want to use it for writing all your Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and much more.

"The Editor is a very good one and could be the subject for review all by itself..."
--The RAINBOW, March 1986

"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride.
-- Hot CoCo, Feburary 1986

The documentation provided with CBASIC is an 8 1/2* 11 Spiral Bound book which contains approximatly 120 pages of real information. We went to great lengths to provide a manual that is not only easy to use and understand, but complete and comprehensive enough for even the most sophisticated user.

"CBASIC's manual is easy to read and written with a minimum of technicalese. "
--Hot CoCo February , 1986

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk. not JDOS compatible.

"The price tag it carries seemed a bit steep for an integer compiler on first glance, but when you add 64K, hi-res drivers, and full-screen editing, CBASIC begins to look more like a bargain.."
-- Hot CoCo February, 1986

"A Complete Editor/Compiler Well Worth its Price"--RAINBOW March 1986

COMMANDS SUPPORTED

I/O COMMANDS : CLOSE, CLOADM, CSAVEM, DRIVE, DSKI$, DSKO$, FIELD, FILES, GET, INPUT,LINE INPUT, KILL, LSET, LOADM, OPEN, PRINT, PRINT@, PUT,RENAME, RSET, SAVEM, WRITE

CONTROL STATEMENTS: CALL,CHAIN, END, EXEC, FOR, NEXT, STEP, GOTO, GOSUB, RETURN, IF, THEN, ELSE, STOP, END, RUN, ON/GOTO, ON/GOSUB, ON ERROR GOTO, ON NMI GOTO, ON IRQ GOTO, ON SWI GOTO, ON FIRQ GOTO, ON RESET GOTO, IRQ ON, IRQ OFF, RAM ON, RAM OFF, RAM64K, IRQ, FIRQ, NMI, SWI, STACK, RETI

COMPILER DIRECTIVES: BASE, ORG, DIM, HIRES, DPSET, GEN, PCLEAR, TRACE ON, TRACE OFF, MODULE

GRPAHICS/SOUND STATEMENTS: PLAY, SOUND, COLOR, CLS, CIRCLE, DRAW, LINE, PAINT, PCLS, PCOPY, PMODE, PRESET, PSET, RESET, SET, SCREEN, POINT, PPOINT, GET, PUT

NUMERIC FUNCTIONS: ABS, POS, RND, PEEK, DPEEK, TAB, ASC, LEN, INSTR, VAL, ERR, ERL, EOF, SWAP, LOF, LOC, FREE, CVN, VARPTR, JOYSTK, SGN, TIMER, OVEREM, DSEARCH, SWITCH, POS@, INKEY

STRING FUNCTIONS: CHR$, LEFT$, RIGHT$, MID$, STR$, TRM$, STRING$, MKN$,INKEY$, BUF$, SWAP$, SWITCH$, HEX$

OTHER/SPECIAL COMMANDS: AUDIO ON/OFF, DATA, DIM, MOTOR ON/OFF, POKE, DPOKE, READ, RESTORE, CBLINK, UNLINK, BRATE, PRATE, MID$=,STACK, VERIFY ON/OFF

To order by mail, send check or money order for the amount of the program plus $3.00 for shipping and handling to the address listed below.

To order by VIAS, MASTERCARD or COD call us at : (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

CER-COMP
5566 Ricochet Avenue
Las Vegas, NV 89110
(702)-452-0632

HI-RES II SCREEN COMMANDER

Are you tired of looking at the 16 line by 32 character display on your CoCo? Do you wish you could see more lines and characters? Then HI-RES II is the answer, it can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without any hardware modifications.

HI-RES II is the most powerful screen enhancement package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, only you have a much better display to work with. It even allows you to have mixed text and Hi-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat feature and allows you to protect up to 23 lines on the screen. HI-RES II features over 30 special control code functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, double size characters, erase line/screen/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

Only $24.95 for Tape and $29.95 for Disk

EDT/ASM 64D

64K DISK EDITOR ASSEMBLER w/DEBUG

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily. It also supports the PBJ 80 Column Word-Pak cards. The disk also contains a free standing Machine Language Debug Monitor, to help you debug your assembled programs.

The Editor in EDT/ASM 64D is the most powerfull, easy to use Text Editor available in any Editor/Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material. Some of it's features include:

- Local and Global string search and/or replace.
- Full screen line editing with immediate line update.
- Easy to use Single keystroke editing commands.
- Load & Save standard ASCII formatted Tape/Disk files.
- Move or Copy single & multiple text lines.
- Create and Edit disk files larger than memory.
- Hi-Res Text Display 28 to 85 columns by 24 lines.
- Supports the PBJ 80 Column cards Word-Pak I & II.

The Assembler portion of EDT/ASM 64D is the part that creates the Machine Language program. It processes the source file(s) created or edited by the text editor and creates a LOADM or CLOADM binary file on either Disk or Tape. Using library files you can assemble an unlimited size file, using several different disk drives.

- Supports conditional IF/THEN/ELSE assembly.
- Supports Disk Library files (include).
- Supports standard motorola assembler directives
- Allows multiple values for FDB & FCB directives.
- Generates listings to Hi-Res text screen or printer.
- Assembles directly to disk or tape in LOADM format.
- Supports up to 9 open disk files during assembly.
- Allows assembly from editor buffer, Disk or both.
- Full description text error messages.

DEBUG is a free standing program debugger which provides all the functions supported by most system monitors. Some of them include:

- Examine and change the contents of memory.
- Set and display up to 10 breakpoints in memory.
- Remove single or multiple breakpoints.
- Display/Change processor register contents.
- Dump Memory in Hex and ASCII format.
- Fill Memory range with a specified data pattern.
- Move a block of memory.
- Search memory range for data pattern.
- Disassemble memory into op-code format.

Requires 32K and Disk $59.00

"The Source"

Now you can easily Disassemble Color Computer machine language programs directly from disk and generate beautiful, Assembler Source Code for a fraction of the cost of other Disassembler/Source generator programs. And, the Source has all the features your looking for in a Disassembler.

- Automatic Label generation.
- Allows specifying FCB, FCC and FDB areas.
- Save, Load and Edit FCB, FCC, and FDB map on Disk.
- Disassembles programs directly from Disk
- Output complete Disassembled listing with labels to the Printer, Screen or both.
- Generates Assembler compatible source files directly to disk.
- Generated source files are in standard ASCII format.
- Built in Hex/ASCII dump/display to locate FCB, FCC and FDB areas in a program.
- Built in Disk Directory and Kill file commands.
- Menu display with single key commands for smooth, Easy, almost foolproof operation.
- Written in fast machine language, one of the quickest and easiest to use Disassemblers available.

Requires 32K and Disk $34.95

TEXTPRO III

"The Advanced Word Processing System"

- 9 Hi-Resolution Display Formats from 28 to 255 columns by 24 lines.
- True Upper and Lower Case display format.
- Three Different Programmable Header lines, re-definable at anytime.
- Programmable Footer line & Automatic Footnote System.
- 10 Programmable Tab stops & 7 Tab Function Commands.
- Automatic Line Justification, Centering, Flush left and Flush right.
- On screen display of underlining and Double size characters.
- Change indents, margins, line length, etc. at anytime in a document.
- Create and Edit files larger than memory, up to the size of a full disk.
- Easily imbed any number of format and control codes for printers.
- Automatic Memory sense 16-64K with up to 48K of workspace.
- Typist Friendly line and Command format entry w/ auto key repeat.
- Fully supports the use of 80 column hardware cards.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other word processors. But, if you want a powerful word processing program with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

Disk $59.95 Tape $49.95

To order products by mail, send check or money order for the amount of purchase, plus $3.00 for shipping & handling to the address below.

To order by VISA, MASTERCARD or C.O.D. call us at the number listed below (Monday thru Saturday, 8am to 5pm PST).

CER-COMP
5566 Ricochet Avenue
Las Vegas, Nevada 89110
☎ (702) 452-0632 ☎

) The A Register contains a value of zero through 14. Write a routine to convert the values as follows:

Zero through eight become one through nine

Nine through 15 become 16 through 22

The routine must consist of fewer than 10 instructions.

) This one shouldn't be too bad. The A Register contains a two's complement number. Divide this number by 8. The result must be valid for either positive or negative numbers. As an example, -100 divided by 8 must produce a result of -12 and +100 divided by 8 must produce a result of +12.

) A table containing values of zero through 255 starts at BUFFER and ends at BUFEND. What does this code do?

```
LOOP1   LDY     #0
        LDX     #BUFFER
LOOP2   LDD     ,X+
        CMPA    ,X
        BLO     NEXT
        LDY     #1
        EXG     A,B
        STD     -1,X
NEXT    CMPX    #BUFEND
        BNE     LOOP2
        LEAY    -1,Y
        BEQ     LOOP1
```

) This is an assembly language subroutine that's called from a BASIC program. It starts at Location $400, the beginning of the text screen. What does it accomplish? Or does it even run?

```
        LDA     #$39
        LDX     #$600
LOOP    STA     ,-X
        BRA     LOOP
```

) At a recent Color Computer User's Group party, there were eight CoCo freaks at a corner table. The following program determines which of these probabilities?

a) The probability that there will be twice as many men as women among the users.

b) The probability that there will be an equal number of men and women among the users.

c) The probability that there will be more men then women among the users.

d) The probability that the user on the left will have an autographed copy of *The Complete Rainbow Guide to OS-9*.

```
        LDX     #0
        CLR     CNT
LOOP1   CLRB
        DEC     CNT
        LDA     CNT
        BEQ     OUT
LOOP2   LSLA
        BCC     NEXT1
        INCB
        TSTA
——      BEQ     FIN
NEXT1   BRA     LOOP2
FIN     CMPB    #4
        BNE     NEXT2
        LEAX    1,X
NEXT2   BRA     LOOP1
OUT     RTS
CNT     RMB     1
```

12) Finally, the last problem: Which two registers in the 6809 can be added together with one instruction?

The Answers

1) This *should* have been an easy one if you remembered that the 6809 has a multiply instruction called MUL. The code is this:

```
LDA     #230    load A with decimal 230
LDB     #15     load B with decimal 15
MUL             find product in D
```

The result, 3450, is in D after multiplying 230 in A and 15 in B ($E6 in A and $0E in B). Remember the MUL instruction is an unsigned multiply. This means each operand in A and B can be zero through 255 and represents only positive numbers. The maximum product will be 255 times 255 or 65,025 ($FE, $01).

2) The code in the question is reproduced again with comments below:

```
        LDD     OP1     load D with operand 1
        LDU     #0      clear quotient
LOOP    SUBD    OP2        subtract divisor
        BLO     OUT        go if residue < 0
        LEAU    1, U       bump quotient
        BRA     LOOP       loop 'til residue < 0
OUT     JMP     OUT        dummy
OP1     FDB     XXX        16-bit dividend
OP2     FDB     XXX        8-bit divisor
```

This code is a divide routine that divides a 16-bit operand in D by an eight-bit operand in memory. The quotient result is in U at the end of the divide. Unfortunately, the 6809 doesn't have a divide instruction, so any division has to be accomplished in software. The division here is not a particularly effective division because it divides by repetitive subtraction. If OP1 is 65535 ($FFFF) and OP2 is one, for example, the loop is executed 65536 times! However, the code here is uncomplicated compared to a bit-by-bit divide and it's not bad to use occasionally.

3) The code in the question is reproduced again with comments below:

```
        LDD     #1      integer
        STD     INT     store for subtract
        LDU     #0      clear result
        LDD     OP      get square
LOOP    SUBD    INT        subtract 1, 3, 5, etc.
        BLO     DONE       go if residue < 0
        LEAU    1,U        bump result
        LDX     INT        set next odd integer
        LEAX    2,X
        STX     INT
        BRA     LOOP       loop 'til residue < 0
DONE    JMP     DONE       dummy
DONE    JMP     DONE       dummy
OP      FDB     XXX        number to find SQR
INT     RMB     2          holds odd integers
```

BARDEN'S BUFFER

Presenting a Quiz for Color Computer Assembly Language

By William Barden, Jr.
Rainbow Contributing Editor

Our local Color Computer Users Group in Orange County, Calif., is an organization with somewhat eclectic interests. Within the organization are special interest groups on BASIC, assembly language, sushi and automatic weapons. In spite of the weird aspects of the user's group, it's fun to attend the meetings. At the last meeting, the chairman of the SIG on assembly language, presented an enjoyable little assembly language quiz. (Actually, it wasn't that enjoyable. The doors were locked and we couldn't get out until we had tried the quiz.)

The quiz is reproduced in this month's column so you can test yourself and see if you really know assembly language as well as you think you do. Readers who get all answers correct will be treated to a sushi lunch and a used AK-47 assault rifle the next time they're in Orange County. The answers to all questions are at the end of this column. A score of 10 to 12 qualifies you as a master assembly language programmer, 7 to 9 indicates that you are a professional AL programmer, 4 to 6 marks you as a journeyman AL programmer, and less than 4 means you better go back and hit the books to brush up on your programming skills.

The Quiz

1) Here's an easy one to begin with. Write an assembly language program to load the A Register with decimal 230 and the B Register with decimal 15, and then find the product of the two numbers in the D Register (A and B).

2) What does this code do?

```
        LDD     OP1
        LDU     #0
LOOP    SUBD    OP2
        BLO     OUT
        LEAU    1,U
        BRA     LOOP
OUT     JMP     OUT
OP1     FDB     XXX
OP2     FDB     XXX
```

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

3) Here's a relative toughie, but if you write down the results for a few test cases, you should be able to see what this code accomplishes:

```
        LDD     #1
        STD     INT
        LDU     #0
        LDD     OP
LOOP    SUBD    INT
        BLO     DONE
        LEAU    1,U
        LDX     INT
        LEAX    2,X
        STX     INT
        BRA     LOOP
DONE    JMP     DONE
OP      FDB     XXX
INT     RMB     2
```

4) If you're reeling from the last problem, here's one that should be easier. The B Register contains a two's complement number. Write a short piece of code to put a zero into the A Register if B is positive, or a -1 into A if B is negative. Hint: The 6809 instructions RELGN and POLITCS are *not* used in the code.

5) This one tests your addressing mode capability. Location $3E00 contains a constant. The X Register contains a value of $3FFF. The Y Register contains $3DC0. The DP register contains a value of $3E. The B Register contains $40. Write down at least four ways to load the A Register with the constant. Assume the instruction to be used is located at $3F00.

6) Here's a tricky one. What does this code accomplish?

```
        LDX     #$4000
        LDD     #0
        STD     ,X
        LDD     #1
        STD     +2,X
FIBO    LDD     ,X
        ADDD    +2,X
        BVS     OUT
        STD     +4,X++
        BSR     FIBO
OUT     RTS
        RTS
```

Readable Equivalents to C

By Calvin Dodge

When I first began programming in C, I had a problem remembering which conditional operators did what (like "!=" for not equal rather than "< >"). Fortunately, the C pre-processor statement "#define" made it easy to rename things and help my memory. I created a file in /d1/DEFS called logic.h containing the following:

```
#define TRUE 1
#define FALSE 0

#define EQUALS ==
#define NOTEQUALTO !=

/* bitwise operations */
#define AND &
#define NOT ~
#define XOR ^
#define OR |

/* logical operations */
#define LAND &&
#define LOR ||
#define LNOT !

#define MOD %

/* end of "logic.h" */
```

Now, in every program I have a line near the beginning that says `#include<logic.h>`. When I type `if(a EQUALS b)`, the compiler knows I mean `if(a == b)`. This makes it easier to avoid typing `if(a=b)`, which means "make a equal to b, then see if a is non-zero."

I hope this technique helps make your programming easier and your programs more readable. A C program can use all the readability it can get!

(Questions about this tip may be directed to the author at 4490 North Yukon Court 2A, Wheatridge, CO 80033, 303-420-9758. Please enclose an SASE when writing.)

Calvin Dodge is a self-employed programmer/consultant. He enjoys OS-9 and C and loves his CoCo. His wife, Elsi, teaches emotionally and behaviorally disturbed children and uses the CoCo to write assignment sheets, reports, and so on. They live in Wheatridge, Colorado.

Let's get into edit mode and call our procedure sieve:

```
B:e sieve
PROCEDURE SIEVE
*
E:
```

A common error I make is to forget the ending quote when I print a string. Here is what happens when I make that mistake:

```
E: print "Missing quote
print "Missing quote
      ^
Error #041
- No Ending Quote
*0000 ERR print "Missing quote
E:
```

When a syntax error like this is detected, the cursor is positioned just before the offending line in the procedure as indicated by the '*'. To correct the error, type a `c` in the control character position. Follow it with a delimiter character which can be a slash or any punctuation character. Next comes the character(s) to change. Here we need to add a character, so enter an `e` to position where the added character is to go, following with a delimiter matching the first one and then `e"`. Here is how it looks and the result:

```
E:c/e/e"
  print "Missing quote"
E:
```

The cursor is now just past the line in the program. If you go back to look at the line again by typing a dash as a control character, it looks different:

```
E:-
*0000    PRINT "Missing quote"
```

Once the line is right, BASIC09 compiles it. On going back, the line was decompiled and the keyword `PRINT` was capitalized. It is good practice to enter programs in lowercase. Then, when you go back over the code or list it to the printer, only the keywords are capitalized. The program will be easier to follow. Now issue a control character 'd' to delete the line:

```
E:d
```

Now enter the following *sieve* program.

```
PROCEDURE sieve
DIM sizeof:INTEGER
sizeof:=8190
BASE 0
DIM flags(8195):BOOLEAN
DIM i,prime,k,count,iter:INTEGER
PRINT "10 iterations"
SHELL "date t"
FOR iter:=1 TO 10
count:=0
FOR i:=0 TO sizeof
flags(i):=TRUE
NEXT i
PRINT "initialized"
FOR i:=0 TO sizeof
IF flags(i) THEN
prime:=i+i+3
(* print prime *)
k:=i+prime
WHILE k<=sizeof DO
flags(k):=FALSE
k:=k+prime
ENDWHILE
count:=count+1
ENDIF
NEXT i
NEXT iter
SHELL "date t"
PRINT count; " primes"
END
```

Now we can start looking at some of the parts that will be in most BASIC09 procedures. Like PASCAL, BASIC09 lacks the dynamic memory management in conventional BASICs. Therefore, variables must be dimensioned to inform BASIC09 how to arrange data memory.

```
DIM sizeof:INTEGER
sizeof:=8190
BASE 0
DIM flags(8195):BOOLEAN
DIM i,prime,k,count,iter:
INTEGER
```

There are a variety of variable types in BASIC09, but only Boolean and Integer appear in our example. The variable `flags (8195)` is an array starting with a 0th member (base 0) with 8195 members. A Boolean variable uses only one byte, so the array `flags (8195)` uses 8196 bytes with its 0 member. Integer variables use two bytes each — more bytes are used to dimension them than their data uses.

Variables are not automatically initialized when the program is run. A variable is assigned memory space. That space may contain any sort of garbage. The following code makes 10 passes through the program and initializes the variable count and array `flag (8195)` at the beginning of each pass:

```
FOR iter:=1 TO 10
count:=0
FOR i:=0 TO sizeof
flags(i):=TRUE
NEXT i
PRINT "initialized"
```

Following the initialization is the program code that does the real work. BASIC09 custom calls for assignments to be made with ":=" rather than just '='. This follows PASCAL practice. For example, the line `count:=0`. However, if we wanted to know if count were a zero in an `IF` statement, the ':' is not used and will give an error. The right way is `IF count=0 THEN`.

OS-9 modules can be called from a running BASIC09 program. Shell "date t" is an example. The sieve program prints the date and time when the program starts and, when it has finished, it serves as a timer except you need to subtract the start time from the finish time to get elasped time.

With the program properly entered, type the control character `q` and press ENTER to leave edit mode. Now BASIC09 checks that variables have all been declared and that all control structure keywords match up properly. If you get error messages, from system mode type `e` and press ENTER which puts you back in edit with your procedure to make corrections. Many times a bunch of error messages show up. One missing `NEXT` or `ENDIF` near the front of the precedure confuses BASIC09 and it produces an error message for each succeeding control structure. When this happens, I list the program from system mode to the printer with the command `list myprogram >/p`. All error messages produced on leaving edit are printed at the end of the listing.

Let's assume you escaped edit mode without incident. Type `save sieve` to save the program to your current data directory. Finally type `run sieve`.

OK, how fast is fast? The C version compiled with the Microware C compiler under OS-9 on my CoCo executed in 24 seconds. Not bad for a machine running at .9 MHz. For comparison, a 22 second time was reported for a C compiled program on an IBM PC at 4.77 MHz clock. Because of lack of integers and memory, the sieve cannot be run under CoCo BASIC. BASICA on an IBM PC was reported with a 1,990 second benchmark running integer variables.

Fanfare please! The BASIC09 sieve took 450 seconds on my CoCo. There was no difference between running source code in the compiler and packed code. More about packing in a later column. I expect doubling the clock rate on the CoCo 3 will halve the run time. Now you know one reason I have not moved to a Tandy 1000 or something similar.

Whenever you are in system mode you can press ENTER and a directory of BASIC09 procedures in your workspace is displayed. An asterisk (*) appears to the left of the last active procedure. This directory also lists the size of each procedure in the workspace, its data space requirements and available workspace memory. Since none of the procedures is running at this time, no data space is allocated. The situation arises when the data space needed by a procedure is larger than available workspace memory. BASIC09 flags this by printing a question mark after the data space requirement for the procedure.

You cannot run a procedure when there is insufficient data space. It is important that you be able to run the source code version of your program from BASIC09 system mode because Debug mode is available. There are a number of strategies available to make this happen. One is to enlarge the workspace to use all available memory. A second is to keep procedures small and load them only as needed. A third is to limit data memory requirements until the procedure is totally debugged. This third option depends on how you dimension variables. We'll discuss that in a later column.

Now it's time to write a short program and get some hands-on experience. With the new CoCo 3, it is going to be fun to measure just how much faster it is at the 1.7 MHz clock rate. There are lots of possible benchmark measures, but one that is generously documented is the *Sieve of Eratosthenes* program to calculate prime numbers. Versions of the program in various languages including C and PASCAL, along with execution times on various microcomputers were published in "Eratosthenes Revisited: Once More Through the Sieve," by Jim Gilbreath and Gary Gilbreath, Page 283, *Byte Magazine*, January 1983.

In BASIC09 system mode, type `e sieve`. This puts you into edit mode, ready to type in the program. You know you are in the editor because the B: prompt of system mode is replaced with an E: prompt. The cursor sits in the space after the colon. Chapter 4 of the BASIC09 manual gives a good description of how to use the editor.

The first character entered after the E: prompt is the command character. BASIC09 source code may be line numbered or not. The ability to eliminate line numbers is one of the language's major strengths. A space typed at the control character position permits entry of any characters that follow as a string. When the ENTER key is pressed, BASIC09 attempts to compile the preceding string to a condensed form known as I code. If it can, all is well and the E: prompt returns for entry of the next line or a control character. If the line cannot be compiled, it is reprinted on the screen with an arrow pointing to the suspected error point along with an error message. At minimum, the message may look like this example from the manual: `01FC ERR #43`.

The 01FC is the number of bytes from the beginning of the procedure to the error that was interpreted to be #43.

To illustrate, let's do a step-by-step example. BASIC09 is loaded and we are at the B: prompt:

```
Basic09
ready
B:
```

68020 - 68020 - 68020

15,204,352 BYTES = 14,848K BYTES = 14.5 MEGABYTES of RAM! - 30 USERS - EXPANDABLE - DMA - PROTECTION with OS9/68K - DYNACALC - STYLO - BASIC09 - FBU - QCOM! Nothing like it ANYWHERE! - INCREDIBLE! - The *QT20x*

FIND OUT MORE! - CONTACT US TODAY!

LIMITED TIME SPECIAL

Complete system with 20 Meg Drive only $4495!

2.5 Meg RAM, 6 Serial Ports 1 Parallel port, RTC.

1976 FHL FRANK HOGG LABORATORY 1986

770 James St., Syracuse, NY 13203 Telex 646740

315/474-7856

BITS AND BYTES OF BASIC

BASIC09 on the CoCo 3

By Richard A. White
Rainbow Contributing Editor

The new Color Computer 3 is here and it's what many of us had been waiting for in a new CoCo. As expected, Level II OS-9 is provided which can fully utilize a 512K machine. The Level II OS-9 package includes BASIC09 rather than an assembler and sells for a modest $79.95.

While all software that runs on a CoCo 2 will run on the new machine (provided undocumented ROM calls are not used), these programs run in the CoCo 2 mode and do not use the enhancements in the CoCo 3. Current BASIC09 provides some graphics support for CoCo 2 modes. Level II BASIC09 is expected to support the new graphics modes. This, coupled with the fact that BASIC09 comes with Level II OS-9, should drastically increase its popularity. Up to now, there has been little incentive for the more casual user to buy BASIC09. The only available software for BASIC09 comes from the OS-9 Users Group. Because of the small group of owners, there has been no commercial BASIC09 software. This may change.

BASIC09 has always had major advantages over Extended Color BASIC. Two of these are speed and programming ease. Provided adequate graphics commands are available in the new version, it will be possible to write game programs that otherwise would need to be written in assembly language or C. This is not to say BASIC09 rivals machine language in speed; it doesn't. But it is much faster than Extended Color BASIC or, for that matter, GW-BASIC running on MS-DOS machines. Couple this with the 1.7 MHz microprocessor speed, and all sorts of programming doors open.

In most respects, BASIC09 is a programmer's dream. First, it is very modular. Separate procedures may be saved separately and loaded as needed from the disk. When the procedure has been used and is no longer needed, it can be killed, freeing memory for other procedures.

Though the current BASIC09 editor is a line editor, it does do syntax checking as each line is entered. I will put up with a line editor just to get this feature. Further, other checks are made when you leave the edit mode. Forget a `NEXT`, for example, and you are told.

The Debug mode is another highly appreciated feature. The syntax and other program details may be correct and the darned thing still won't work. With Debug, you can single step through the program and really see what is happening.

In the February RAINBOW (Page 231), I talked about how to get set up to use BASIC09. Those instructions may not necessarily apply to the Level II version. Still, if you are just getting started with BASIC09, you may want to study that column. In March, I discussed what happens when you first get BASIC09 up and running (Page 226). I'm going to summarize some of that material, but you may want to read that article, too.

The BASIC09 distribution disk comes with four files. At minimum, two of these, basic09 and runb must be copied to the CMDS directory of your system disk. We'll worry about the other files later. With the CMDS as your execution directory, type `EX BASIC09 #10K`. BASIC09 loads and you are in its system mode. The #10K provides 10K bytes of workspace. If you don't do this, BASIC09 defaults to a 4K byte workspace of which a little over 1K is allocated for BASIC09's own use. You can change the workspace size from system mode. Type `mem 10000` to get 10K bytes. Type `mem` and available workspace memory is displayed. Available memory for the workspace depends on which procedures are loaded when you boot OS-9. I can use as much as 14K and still have some memory left outside BASIC09 for loading and using disk-resident OS-9 utilities.

You can do a number of things in the system mode. Type `e` or `edit`, and a procedure name, and you enter the edit mode. This is the line editor which permits you to write a program module or edit one whose source code was loaded while you were in the system mode. Once you have entered and edited your program, you will want to run it to see if it works. While in edit mode, type `q` and press ENTER to return to system mode. Now you can type `run` and the procedure name to run the program. Note that in BASIC09, programs or program modules are called procedures.

Despite the syntax checking the editor does as you enter program lines and the checking done when you quit the editor, there may still be problems in your program. Some of these BASIC09 will find as the program runs. In this case, it puts you into Debug mode and displays the offending line along with an error message. If you have printerr in your boot and the file of error messages on your system disk, you get an error number and message. Otherwise, you get only an error number which you can look up in the BASIC09 manual. At this point, make sure you understand which line has offended BASIC09 and the type of error, and press ENTER to return to the system mode.

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS *database management program.*

```
HT=(RND(5026)+10):GOSUB HT
```

However, this always sends the computer back to Line 0. Hopefully there is a simple answer to this problem and I will feel foolish when I see it.

Kurt Hegle
Duluth, MN

I have seen the following lines in a few programs:

```
10 X=RND(10):IF X=0 THEN 10
20 ON R GOTO 30,40,50,60,70,80,
  90,100,110,120
```

See if this method will work for you, Kurt.

- *I have written a mailing list program which writes a disk file containing all the information. Since I own a CoCo that won't handle the speed-up poke, the program is extremely slow. I have been contemplating rewriting the program in machine language but I can't figure out what to do with the disk routine. The disk manual lists only one built-in subroutine and it doesn't tell me how to update the directory. How is the directory set up and how do I update it?*

Blair G. Learn
Trafford, PA

It sounds like it would be simple, doesn't it Blair? Well, it's not. Communication between the CoCo and disk files is accomplished by the use of FCBs, or file control blocks of data. A description of how all of this works is beyond the scope of this column, but if you can follow an assembly listing of the machine code I would recommend *Disk BASIC Unraveled*, available from Spectrum Projects. This book also explains how all of this works, but it's not for casual reading.

- *I am interested in writing some assembly programs to access the disk drive directly without calling DSKCON. I have the addresses for the controller's registers, but I need the specifications for these registers. For example, I know that the status/command register is at $FF48 but I don't know what the status bits represent. I know several of the commands, but I am looking for a complete list. I am hoping to write a CoCo-MS-DOS utility that would allow cross copying and formatting similar to the one published in THE RAINBOW.*

David Fulmer
Herminie, PA

David, I would again suggest *Disk BASIC Unraveled.* It has an extensive explanation of the WD 1793 Floppy Disk Controller, including commands and the buffer addresses you mention.

- *My printer requires receipt of an actual line feed character to perform this function. It cannot be derived from carriage return. Is there a poke or relatively simple software modification to cause the carriage return/line feed combination?*

David Schoepf
Vicksburg, MS

We have printed a program for generating LFs several times in the RAINBOW. If you want to obtain a copy of the program without looking through the back issues, try the BASIC database on Delphi. Look for a program called *LFCR*, David, submitted by you-know-who. I use this program all the time.

- *What are the advantages/disadvantages of a Multi-Pak versus a triple Y cable?*

If I only have three ROM Paks, is there a reason why I should consider a Multi-Pak?

Philip Raleigh
Augusta, MI

If you are using ROM Paks, Philip, you have to have a Multi-Pak. ROM Paks have no address decoding scheme to distinguish where they are located in memory. Another way to state the same thing is that all ROM Paks are at the same memory address, $C000. By using a Multi-Pak you select the one you want to use by enabling the chip select line for that particular slot. Some other hardware has address decoding circuitry, therefore a Multi-Pak is not necessary.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick DELPHI MAIL, then type SEND **and address TO: DANDOWNARD. Be sure to include your complete name and address.**

SINGLE BOARD 6809 CPU
6809 Processor, Eprom & 8K Static Ram.
Interfaces directly to I/O Port and 48K Ram expansion board.
ANALOG AND DIGITAL I/O PORTS
Parallel 8 bit input & output for your CoCo, and Models 1, III, 4.
• MODULAR DESIGN FOR ADDITION OF MULTIPLE PORTS

SINGLE BOARDS (Requires 5V Supply)	
I/O port kit (J107K)	**$35**
A-D/D-A Interface (J202K)*	**$35**
CoCo Adapter-required for CoCo (J110K)	**$15**
5 Volt Power Supply (D100K)	**$25**
Relay Array Kit (J027K)	**$32**
*requires J107K I/O Port kit	
Stand Alone 6809 CPU Board (MX 90)	**$40**
48 K Static Ram Board (MS 488)	**$50**

COMPLETE SYSTEMS
DIGITAL MEMORY SCOPE—Converts the CoCo TV display into an oscilliscope screen. *Maximum Sample Rate . . . 10 khz.
(S101M) $149.00
DIGITAL RECORDER and DELAY—Record and play back audio signals up to ten seconds.
(S102M) $169.00
2716 EPROM Programmer-Programs and verifies from CoCo's memory.
(S103M) $149.00

D & A Research
400 Wilson Avenue
Satellite Beach, FL 32937
305/777-7853

PBBS 4.5 OS-9 BULLETIN BOARD
Features: 300/1200/2400 Baud - Users groups
2500 Download files - Multiple sub-boards - Chat
Many improvements over 4.2 - EXPANDABLE!!!
Requires: OS-9 - Basic09 - TRS-80 RS-232 pak
480K disk space: RAM/Hard/floppy drives - Multipak
Auto-answer modem - 64K CoCo 1, 2, or 3
Send Money Order for $50.00 to: (AZ res. add 6.5%)
S. D. Roberson
1702 W. Mountain View Dr.
Mesa, AZ 85201
See PBBS in operation 24 hours a day: 602-844-7840

DOWNLOADS

Extending Your BASIC ROM

By Dan Downard
Rainbow Technical Editor

• *A few months ago, one of my relatives bought a 16K CoCo 2 with standard Color* BASIC. *It was child's play to upgrade it to 64K, and I can easily buy an Extended* BASIC *ROM in Montreal. Do I only have to replace the chip or is there any jumper or soldering needed to complete the job?*

Alain Hetu
Montreal, Quebec

On the original Color Computer and most CoCo 2 models, Alain, the Extended BASIC ROM is a 24-pin chip that simply plugs into the empty socket next to the existing Color BASIC ROM. With this version, no jumper changes are necessary.

On a number of CoCo 2s manufactured in Korea, the existing Color BASIC 24-pin chip is installed in a 28-pin socket; to install Extended BASIC, you replace this chip with a different 28-pin device that contains both Color BASIC and Extended BASIC. In addition, several jumper wires (marked 64K next to the wire and 128K near an adjacent hole) will have to be changed so that the 128K side is connected to the center hole.

Check your machine before buying a ROM to install in it, and make sure the dealer sells you the right chip for your version of the CoCo.

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

• *I am working on a BBS program right now and was wondering how to make the user's screen clear in this program. I know it is a type of character code but I don't know what the code is.*

Steve Slack
Bear, DE

It depends on what type of terminal software the BBS user has, Steve. Normally an escape sequence is used by most modern terminal emulation software to clear the screen and home the cursor. Unless your BBS has the capability of customizing the user in terms of his terminal type, I wouldn't even try to send a clear screen code.

• *I have an Adds-Regent-200 Terminal. Is there any way to use the monitor with my CoCo? The Regent monitor uses separate horizontal, vertical and video inputs. Could it be interfaced with the RS-232 I/O?*

John G. Wood
Schenectady, NY

John, there are two ways to use the terminal, but you can't use just the monitor. The *Remote2* program in this issue of the RAINBOW permits operation of your CoCo from a remote terminal.

Another way to accomplish this task is by using the multi-user features of OS-9. OS-9 has the ability to be shared by a remote terminal either through the serial I/O input on the rear of your CoCo, or by use of an RS-232 Pak.

• *I'm attempting to start a new BBS i San Diego and Denver for the Colo Computer. The problem is that I can' find an I/O driver for a* BASIC *program If you can help me at all I would reall appreciate it.*

Matthew Lemons
San Diego, CA

Matthew, the *Remote2* progam mentioned in the previous letter will also solve your problem, and for the price o your RAINBOW magazine.

• *I am using a 64K Color Computer i Mexico City which is at an altitude o 7,250 feet above sea level. In the environmental specifications for the CoC it says: altitude -100 to 6,000 feet abov sea level. Why? Will I have any problems? So far it's working just fine.*

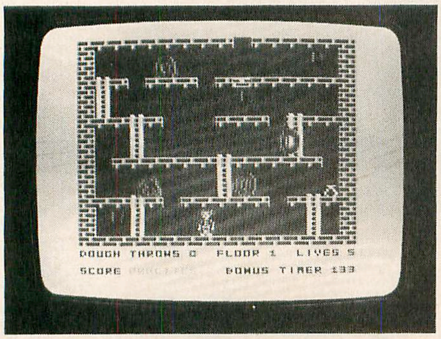
A. Bromber
Mexico City, Mexic

I am sure your CoCo will work fin in Mexico City, but I do not know th reason for the altitude limitation. I' sure we have someone reading th column who can satisfy our curiosity though.

• *I am writing a program in which I would like to* `GOSUB` *a random choice of lines between 11 and 5036. Here is how I am attempting to do this:*

Look What's New at NOVASOFT!

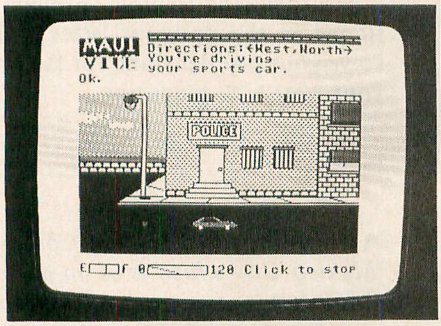
Top-quality software at affordable prices, written by well-known authors in 6809 Machine Language



NEW RELEASE
DONUT DILEMMA

Angry Angelo has raided Antonio's Donut Factory sending the entire complex amuck! Donuts have come alive and all the machines are out of control. You must reach floor 10, past the Fat Spurters, Cream Blasters and Berserk Bucket to name a few, and deactivate the power generator to restore law and order. But hurry! Time is running out!

Requires 32K
Tape $21.95 Disk $24.95



Directions:<West,North>
You're driving
your sports car.
Ok.

Maui Vice

Step into the shoes of Crockett & Tubbs, and gather evidence, photographs and witnesses to convict your suspects! With "windows" to select your options, hi-res graphics, and a new story generated each time you play. This is state-of-the-art that guarantees excitement and newness every time you play.

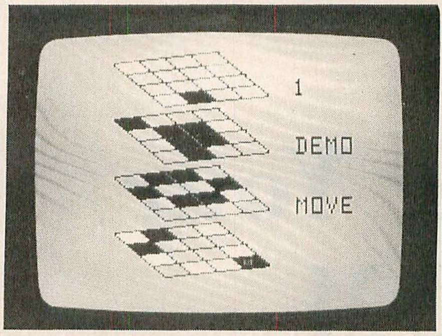
64K Ext. Basic & Joystick Required
Tape $18.95 Disk $21.95

Other Best Sellers

The Misadventures of Eddie—Eddie is roaming through time creating havoc-and you must bring him home! Over 140 locations, 50+ commands, hi-res grapic adventure. 64K Disk $21.95

Brewmaster—Move along the end of the bars, serving beer to your thirsty customers. Fast-paced action. 32K & Joystick.
Tape $14.95 Disk $17.95

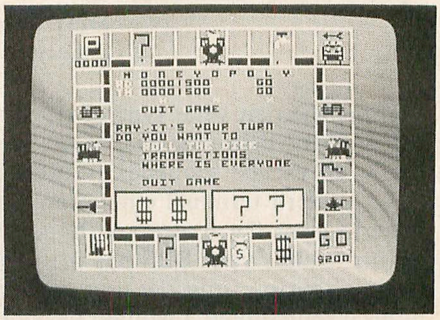
Martian Crypt—Life once existed on Mars! Find the hidden Martian crypt. Animated hi-res graphic adventure with sound effects.
32K Tape $18.95 Disk $21.95



NEW RELEASE
FOURCUBE

Now you can play TIC-TAC-TOE in 3D. The board consists of a 4x4x4 grid of cells. Pit your wits against the computer with six levels of difficulty or against your favorite opponent. Sound easy? Try it and you'll agree with us when we say its a "real challenge".

Requires 32K 1 or 2 Players
Tape $15.95 Disk $18.95

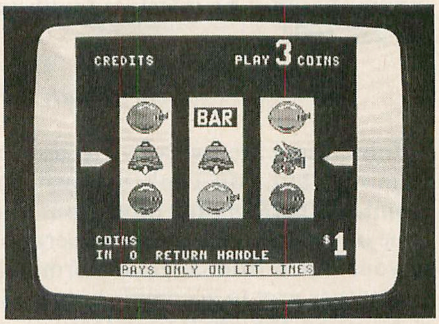


RAY,IT'S YOUR TURN
DO YOU WANT TO
TRANSACTIONS
WHERE IS EVERYONE
QUIT GAME

Moneyopoly

Play the popular board game on one of the most realistic computer game simulations ever! Contains all the features of the original. Buy, sell, rent, wheel & deal your way to fortune.

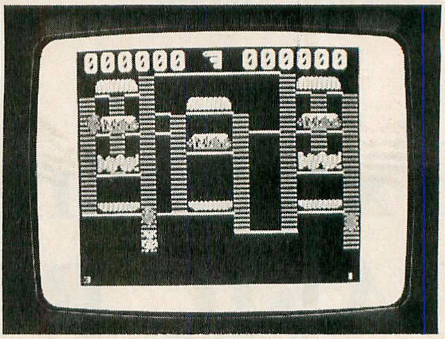
32K Joystick Required
Tape $19.95 Disk $22.95



Vegas Game Pak

Six games in all! Blackjack, Keno, Video Poker & 3 slot machine lookalikes. Super graphics!

16K Ext. Basic Required
Tape $24.95 Disk $27.95



NEW RELEASE
LUNCHTIME

Your chef, Peter Pepper, is surrounded! Dodge pickles, hot dogs, and eggs while building hamburgers. This high res game features 7 difficult levels of wild entertainment. Fast paced action for either one or two players. Have a Burger Time. . .

Requires 32K & Joysticks
Tape $18.95 Disk $21.95

Tom Mix Products at New Reduced Prices!

Sailor Man—Defeat the bigfatbadguy and win Elsie's heart. Super graphics.
64K Tape $24.95 Disk $27.95

Dragon Slayer—Defeat the dragon by finding your way through a mountain maze. Gather treasure but avoid the deadly traps! 160 exciting screens.
32K & Joystick or Keyboard
Disk $24.95

The King—
32K Tape $24.95 Disk $27.95

Draconian—
32K Tape $19.95 Disk $22.95

Ms. Maze—
32K Tape $19.95 Disk $22.95

Kater Pillar II—
16K Tape $19.95 Disk $22.95

Warehouse Mutants—
16K Tape $18.95 Disk $21.95

Buzzard Bait—
32K Tape $19.95 Disk $22.95

NOVASOFT
A Tom Mix Company
P.O. Box 201
Ada, Michigan 49301
616/957-0444

Ordering Information

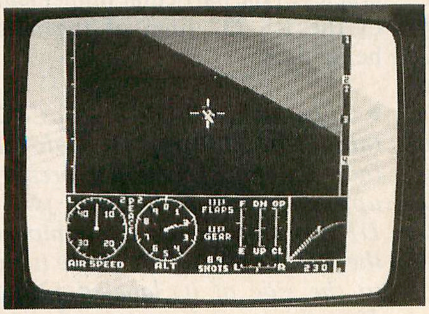
- Add $3 shipping/handling
- MI residents add 4% sales tax
- Dealers welcome
- Many more titles—write for free catalog!

Credit Card Orders

Call 616/957-0444

MasterCard VISA®

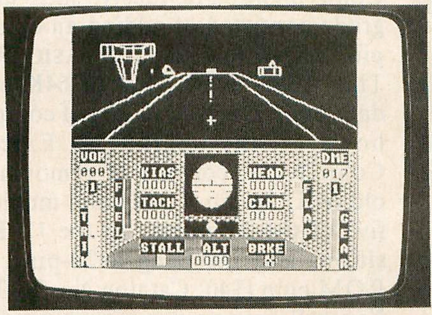
TOM MIX'S MINI-CATALOG



P-51 Mustang Attack/Flight Simulation

The ultimate video experience! Link two CoCo's together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of this program). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations—against another player OR against the computer.

32K Machine Language
Flight Manual Included
Tape $29.95 Disk $34.95



Worlds of Flight Small Plane Simulation

Real-time simulation generates panoramic 3-D views of ground features as you fly your sophisticated plane in any of nine different "worlds." Program models over 35 different aircraft/flight parameters. Realistic sound effects too! Manual included helps you through a typical short flight.

32K Machine Language
Flight Manual Included
Joysticks Required
Tape $29.95 Disk $34.95

Educational Best-Sellers!

Teachers Database II—Allows teachers to keep computerized files of students. Recently updated with many new features!

- Up to 100 students, 24 items per student
- Many easy-to-follow menus
- Records can be changed, deleted, combined
- Statistical analysis of scores
- Grades can be weighed, averaged, percentaged
- Individual progress reports
- Student seating charts
- Test result graphs/grade distribution charts

64K TDBII $59.95 Disk Only
32K TDBI $42.95 Tape $39.95

NOW AVAILABLE FOR IBM PC & COMPATIBLES-Holds information on up to 250 students with as many as 60 individual items of data for each. Contains the features listed above PLUS.

Requires 128K - $89.95

Factpack—Three programs for home or school use provide drill and practice with basic "-/+/÷/x" Grades 1-6.

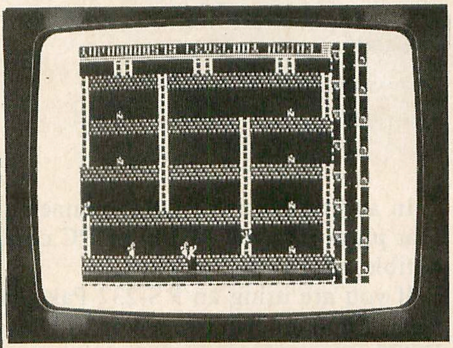
32K Ext. Basic
Tape $24.95 Disk $29.95

Vocabulary Management System—Helps children learn and practice using vocabulary and spelling words. Eleven programs including three printer segments for tests, puzzles, worksheets and five games; many features make this a popular seller!

Requires 16K Ext. Basic/
32K for Printer Output
Tape $39.95 Disk $42.95

Fractions—A Three-Program Package. 1/Mixed & Improper 2/Equivalence 3/Lowest Terms. Practice, review and definitions make learning easy.

32K Ext. Basic
Tape $30.95 Disk $35.95



NEW RELEASE
GOLD FINDER

Here's the quality you have come to expect from TOM MIX. Another outstanding color computer game. This one ranks right up there with "Donkey Kong". Listen to this: 69 levels for one or two players PLUS you can create your own levels (up to 306 on a disk). Endless possibilities await you in this exciting new creation. Move over Goldrunner and Loderunner, here comes GOLD FINDER. . .

32K & Joysticks Required
Disk $27.95

We Have More Software Available Than Listed Here. Please Write for a Free Catalog!

Unique Utilities!

New! Use the tools we've used to create "Donkey King," "Sailor Man" and others!

- Full use of 64K RAM
- 100% Machine Language
- No ROM Calls
- Selectable Drive
- Support 1-4 drives
- Menu Selected functions
- "Cold Start" exit to Basic
- Parameters easily changeable in basic loader

MAS Assembler—the finest ever! (Includes EDT)

Disk $74.95

EDT—Effortless full screen editing w/2-way cursor. Text files to 48K+. Copy, save, move, delete, print blocks, much more!

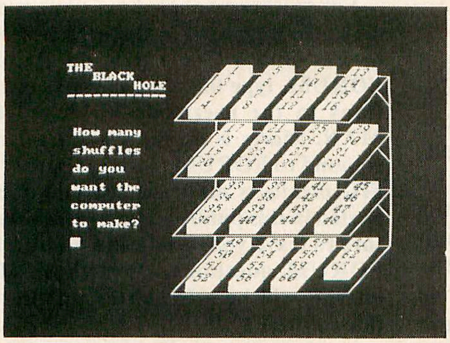
Disk $39.95

Deputy Inspector—Alphabetize, resort and backup directory; fast 3-swap backups, copy files or programs, auto-reallocate granules during backup for faster loading, more!

Disk $21.95

Sector Inspector—Alphabetize, backup and print directory; repair crashes, LLIST basic programs, read in and edit 23+ grans, much more!

Disk $29.95



```
THE BLACK
        HOLE
------------

How many
shuffles
do you
want the
computer
to make?
```

NEW RELEASE
THE BLACK HOLE

For anyone who enjoys solving a challenging logical puzzle, here is a 3-dimensional puzzle composed of 63 numbered cubes in a 4 by 4 by 4 array that leaves one BLACK HOLE. You tell the computer to sort the cubes and the computer tells you to put them in numerical order. A real brain bender. Outstanding color and action. Years of entertainment. . .

For IBM PC & Compatibles
$24.95

More Tandy-IBM/PC software available.

TM

TOM MIX SOFTWARE
P.O. Box 201
Ada, Michigan 49301
616/957-0444

Ordering Information

- Call us at 616/957-0444 for Charge Card orders
- Add $3.00 postage and handling
- MI residents add 4% sales tax
- Authors—We pay top royalties!

MasterCard
VISA®

• *I have a CoCo 1 (Catalog No. 26-3003) I have upgraded to 64K. I cannot get the high-speed poke (*`POKE 65495,0`*) to work.*

Ronald J. Hauck
Hilton, NY

Neither the CoCo 1 nor 2 was designed to run with either high-speed poke. The chips on the board and the layout of those chips and their support circuitry were not designed for reliable operation at those speeds. It is true that some CoCo 1s and most CoCo 2s do appear to run faster after the high-speed poke, but I recommend never using it for any serious computing. All models of CoCo 1 computers are less likely to even appear to run properly at higher speeds because of RFI "smog-control" capacitors on the 'E' and 'Q' clock that distort the clock signals. These capacitors are best yanked out in the interests of cleaner operation at the normal speed. On your 'F' or "NC" board revision model of CoCo, this means cutting out C36 and C37 (both small 56 pF [picofarad] disk capacitors). On earlier 'D' and 'E' board CoCo 1 models, these are numbered C73 and C75. While you are at it, I suggest you cut out C30 (also a 56 pF capacitor). On 'D' and 'E' board CoCo 1s that means cutting out C86 (a 220 pF capacitor).

The CoCo 3 was designed from the start to properly operate at full double speed.

• *I am attempting to use my CoCo as a terminal for my IBM PC compatible. I use the MODE command and changed consoles to COM1 using MS-DOS' CTTY command. I am using* VIP Term *on my CoCo, but I cannot get this to work. I suspect a problem in the way I wired my null modem cable.*

Bruce Bell
Rockmart, GA

• *I am trying to use* Deskmate*'s Telecom to transfer data between my CoCo and my Tandy Model 100. I can get keypresses on the M 100 to display on the CoCo screen but not the other way around. I also tried using the software in my RS-232 Program Pak for my CoCo, but had the same problem. Can you help?*

Graeme Mead
Kuala Belait, Brunei

I own both a Model 100 and an IBM PC XT-compatible, and I, too, had problems getting my CoCo to talk properly to them. I use the PBJ 2SP dual RS-232 Pak and *Mikeyterm* on my CoCo, and use *PROCOM* on my PC compatible and either normal Telecom or Telecom enhanced by Sigea System's *XTEL* on my Model 100. The solution to my cable problem involved arranging for proper handshaking on the RS-232 control line(s). Those using PBJ 2SP-Pak or the bit-banger port itself should use the following cable:

CoCo bit banger or PBJ 2SP port four-pin DIN connector	Model 100 or PC compatible DB25 connector
Pin 1 (carrier detect)	Pins 6, 8 and 20 (short those pins and hook them to Pin 1 of CoCo)
Pin 2 (RD)	Pin 2 (TD)
Pin 3 (gnd)	Pin 7 (gnd)
Pin 4 (TD)	Pin 3 (RD)

In addition, on the DB25 connector that plugs into the M 100 or PC compatible, short Pin 4 to Pin 5.

If you are using an RS-232 Pak, the needed null modem connector will have DB25 connectors at both ends:

CoCo RS-232 Pak DB25 connector	PC Compatible or M 100 DB25 connector
Pin 2 (TD)	Pin 3 (RD)
Pin 3 (RD)	Pin 2 (TD)
Pin 7 (gnd)	Pin 7 (gnd)
Short together pins 5, 6 and 8 of CoCo RS-232 Pak DB25 connector	Short together pins 4 and 5, and short pins 6, 8 and 20 of the M 100 or PC compatible connector.

(On the PC compatible, pins 4 and 5 are not connected to pins 6, 8 and 20.)

In general, the problem Mr. Mead described is one in which the DCD or DSR line going to the UART of the RS-232 Pak is not properly activated, causing the transmitter part of the UART to shut down. Shorting the pins as I described should tie those lines high and allow proper functioning of the RS-232 Pak, for Pin 5 of that pack is internally tied high (active). Note there is no such thing as an "all purpose" null modem connector. Such a connector must always be tailored to the idiosyncracies of the particular implementation of the RS-232 lines of the machines being used.

• *I just looked inside my CoCo 2 (Catalog No. 3134A) 16K Color* BASIC *(non-Extended) computer, preparing to upgrade it to 64K using two 4464 DRAM chips. I saw five jumpers near the ROM socket (four above it and one to the side of it) labeled 128K/64K. Does this mean I can upgrade my CoCo 2 to 128K?*

Greg Vargo
Oklahoma City, OK

Those five jumpers have nothing to do with the RAM memory of your computer, which cannot be upgraded beyond 64K. Rather, they relate to the number of bits in the ROM chip used for the BASIC operating system. They are provided to allow upgrading from Standard Color BASIC to Extended Color BASIC. Previously, such an upgrade consisted of adding an extra 24-pin, 8K-by-8 Extended BASIC ROM. This ROM had a total of 64K bits of data on it. On your model of computer, however, the upgrade to Extended Color BASIC consists of removing the old 64K, 24-pin ROM chip, moving all five of those jumpers to the 128K position, and inserting a 28-pin, 128K ROM chip ($40, Catalog No. 26-3018). You will have to use a wire cutter and soldering iron to move those five jumpers.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

For quicker response time, your questions may also be posted in the FORUM section of RAINBOW's CoCo SIG on Delphi. In FORUM, type `ADD` and address your questions to the username MARTYGOODMAN. Marty is on most every evening to respond to FORUM messages. Other CoCo SIG members may also reply to questions posted in this public message area. Please be sure to leave your name and address in any FORUM questions, since those of wide interest will be selected for publication in this column.

COCO CONSULTATIONS

Memory Expansion Magic

By Marty Goodman
Rainbow Contributing Editor

• *While upgrading a CoCo 2 (Catalog No. 26-3134B) from 16K to 64K, I noticed board pads for eight 4164 (64K by 1) chips and sockets for two 4464 (64K by 4) chips. Can memory be increased either way or can both be added for 128K with switching?*

I am interested in upgrading my CoCo to 128K using the Polycom board. Is this feasible?

Phil Creasy
Hermitage, PA

I have seen the board you refer to. The CoCo 2 in question was *not* designed to be upgraded to more than 64K by Radio Shack. The upgrade using two 4464 chips is by far the preferred approach.

All 128K CoCo 1 or CoCo 2 upgrades are obsolete. The only memory upgrades to even consider are the 256K and 512K upgrades. Of these, the two to consider are the J&R Banker and the Disto RAM Disk Card, both advertised in RAINBOW. The J&R Banker has the advantage of not requiring a multipack, but unless you make a correction in its design (outlined in a file on Delphi in the hardware hacking topic area) it causes incompatibilities with existing software. It is installed inside the CoCo and requires some electronic ability. The Disto RAM card requires a multipack and is less flexible than the J&R Banker in that video memory cannot be addressed to it and access is slower. However, it will work with all models of CoCo, including the CoCo 3, and it can be upgraded to 512K or even to one megabyte. Installation is easy, just plug it into the multipack.

Neither upgrade works well as a RAM disk under Disk BASIC, but both work excellently as a RAM Disk under OS-9.

• *I want to offset load an ML program to an address in memory below the address it normally goes to. The Disk BASIC Manual only tells me how to offset load it to an address above where it normally goes. Can you help me?*

Andrew Elliner (CROPPER)

The offset load address works in groups of 65,536 address locations (Modulo Hex 10000). That is, if you have an ML program that normally loads starting at Hex 8000 and you want to load it in starting at Hex 4000, type `LOADM "filename",&HC000`. As another example, if you saved your Disk BASIC ROM to disk using `SAVEM "ROM", &HC000,&HDFFF,&HA027`, and now want to load it into memory starting at Hex 3000 in RAM, just type `LOADM "ROM", &H7000`. In general, to offset load an ML file that normally loads in at Address S to Address N (where N is smaller than S), type: `LOADM "filename",(65536-S)+N`

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

```
0329           ENDIF
032B         NEXT count
0336         erase=1
033D       ENDLOOP
0341       REM *
0345       REM * this subroutine uses an input value
036D       REM * of 0 to 60 to draw a hand on the clock
0398       REM * at the 0 to 360 degree positions
03BD       REM *
03C1 10    angle=360/60*lasttime(count)
03D6       IF count=3 THEN
03E2         radius=120
03E9       ELSE
03ED         radius=160
03F4       ENDIF
03F6       x2=x1+SIN(angle)*radius
040B       y2=y1-COS(angle)*(radius/2)
0423       RUN gfx2("line",x1,y1,x2,y2)
0443       RETURN
```

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Use all 64k of RAM for program storage and/or variables
- Full Floating Point arithmetic expressions with functions
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory
- Many new commands that expand your programming capability

Commands Supported

1. I/O -Commands
CLOSE CLOADM CSAVEM DIR DRIVE DSKIS DSKO$ FIELD FILES
GET INPUT KILL LSET OPEN PRINT PUT RSET USING

2. Program Control Commands
CALL END EXEC FOR STEP NEXT GOSUB GOTO IF
THEN ELSE ERROR ON..GO RETURN STOP SUBROUTINE

3. Math Functions
ABS ASC ATN COS CVN EOF EXP FIX INSTR
INT LEN LOG LOC LOF PEEK POINT PPOINT RND
SGN SIN SQR TAN TIMER VAL

4. String Functions
CHRS INKEYS LEFTS MIDS MKN$ RIGHTS STRS STRINGS

5. Graphic/Sound Commands
COLOR CLS CIRCLE DRAW LINE PAINT PCLEAR PCLS PLAY
PMODE PRESET PSET RESET SCREEN SET SOUND

6. Other/Special Commands
DATA DIM LLIST MOTOR POKE READ REM RESTORE RUN
TAB VERIFY DLD DST IBSHFT LREG PCOPY PMODD PTV
REAL SREG SWP VECTD VECTI

Compiled Program Speed (Time in minutes:seconds)

Program	Interpreter	MLBASIC
Eratosthenes Sieve	6:58.7	0:06.3
Matrix Fill,Mult,Sum 10x10	0:30.9	0:02.5
String Manipulation	6:22.5	2:17.7
Floating Point	0:32.6	0:30.6
Disk I/O (2000 PRINT/INPUTs)	2:21.5	0:27.6

RAINBOW CERTIFICATION SEAL

DON'T HESITATE...BUY MLBASIC TODAY

Disk - $69.95
Tape - $69.95
Both - $74.95

64 K REQUIRED

WasatchWare

7350 Nutree Drive
Salt Lake City, UT
84121

Include $4.00 Shipping and Handling
Utah residents add 5.75 % tax
Check or Money Orders Only (No C.O.D.)

CALL (801) 943-6263

MicroWorld
&
MicroWorld II

230 Moorestown Rd. Wind Gap, PA 18091
(215) 759-7662

LOW PRICES, (SHIPPING INCLUDED)
ON 100% TANDY EQUIPMENT

Tandy 1000	$575
w/2-disk, 256k	$799
Tandy 1000EX	$585
Tandy 1000SX	$875
DMP-105	$110
DMP-130	$269
DMP-430	$535
CoCo II	$120
CoCo 3	$170
Drive 0	$185
Multipack	$75

15% OFF ALL OTHER TANDY HARDWARE !!
20% OFF ALL OTHER TANDY SOFTWARE !!

Prices & availability
subject to change

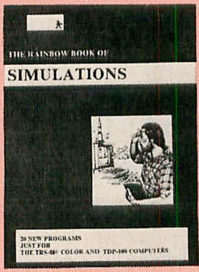
Listing 4: `clock4`

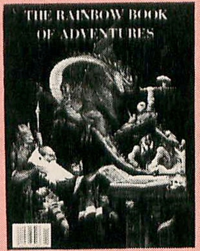
```
0000        REM *
0004        REM * clock4
000F        REM * run the clock
0021        REM *
0025        REM * define the variables to use
0045        REM *
0049        DIM x1,y1,x2,y2:INTEGER
005C        DIM count,erase,radius,angle:INTEGER
006F        DIM time(3),lasttime(3):INTEGER
0084        DIM gettime:STRING
008B        REM *
008F        REM * initialize the variables
00AC        REM *
00B0        x1=320
00B8        y1=95
00BF        erase=0
00C6        DEG
00C8        REM *
00CC        REM * set the drawing color to "cyan"
00F0        REM * and the drawing mode to "XOR,"
0113        REM * producing "red" hands on the
0134        REM * white portion of the clock face
0158        REM *
015C        SHELL "display 1b 32 06"
0170        SHELL "display 1b 2f 03"
0184        REM *
0188        REM * this is the actual time-keeping
01AC        REM * loop
01B5        REM *
01B9        REM *
01BD        REM * wait for the time to change
01DD        REM *
01E1        LOOP
01E3          WHILE DATE$=gettime DO
01EE          ENDWHILE
01F2          REM *
01F6          REM * get the time, convert to integer, and save in time array
0233          REM *
0237          gettime=DATE$
023D          time(1)=VAL(MID$(gettime,16,2))
024F          time(2)=VAL(MID$(gettime,13,2))
0261          time(3)=5*VAL(MID$(gettime,10,2))+time(2)/12
0281          REM *
0285          REM * determine whether hours, minutes and/or
02B1          REM * seconds changed, if so, redraw the hand
02DD          REM *
02E1          FOR count=1 TO 3
02F1            IF time(count)<>lasttime(count) THEN
0304              IF erase<>0 THEN
0310                GOSUB 10
0314              ENDIF
0316              lasttime(count)=time(count)
0325              GOSUB 10
```

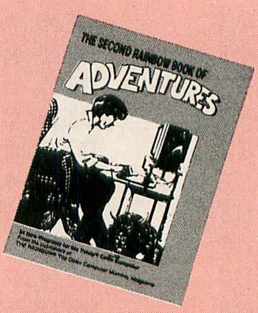
Recommended Reading for Your CoCo from . . .

The Rainbow Bookshelf

THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble


THE RAINBOW BOOK OF
SIMULATIONS
20 NEW PROGRAMS JUST FOR THE TRS-80 COLOR AND TDP-100 COMPUTERS





The Complete Rainbow Guide To OS-9

The book that demystifies the state-of-the-art operating system for the Tandy Color Computer. Authors Dale L. Puckett and Peter Dibble show you how to take advantage of OS-9's multi-tasking and multi-user features, and the capability of redirecting input and output commands at will. An easy-to-read, step-by-step guide packed with hints and tips, tutorials and free software in the form of program listings.

Book $19.95, Disk $31.00 (2 disks, book not included)

The Rainbow Book of Simulations

Features 20 award-winning entries from THE RAINBOW's first Simulation programming competition. You are the Commander-in-Chief of the Confederate Army during the Civil War, an air traffic controller at one of the nation's busiest airports, the owner of your own software business, a civil defense coordinator in charge of saving Rainbow City from a raging flood, a scientist conducting experiments on Mars . . . Your wits are on the line.

Book $9.95, Tape $9.95

The First Rainbow Book of Adventures

A collector's item containing 14 winning programs from THE RAINBOW's very first Adventure contest. Includes such favorites as *Sir Randolf of the Moors, Search for the Ruby Chalice, Deed of the York, Horror House, One Room, The Door* and *Dr. Avaloe.* Plus, hints and tips on solving Adventures.

Book $7.95, Tape $7.95

The Second Rainbow Book of Adventures

Our newest arrival features 24 of the most challenging Adventure games ever compiled. Meet the Beatles and battle the Blue Meanies, find a hidden fortune, or win the heart of a beautiful and mysterious princess. Experience the thrills and chills of the most rugged Adventurer without ever leaving your seat. *Ring Quest, Secret Agent Man, Dark Castle, Curse of Karos, Island* and more!

Book $13.95, Tape $13.95

Coming soon
The Rainbow Guide to Introductory Statistics
The Second Rainbow Book of Simulations

For greater convenience, order RAINBOW Books and Tapes through the shopping area of the CoCo SIG of Delphi!

I want to start my own Rainbow Bookshelf!

Please send me:

☐ The Rainbow Book of Simulations	$ 9.95	________
☐ Rainbow Simulations Tape	$ 9.95	________
☐ The Complete Rainbow Guide to OS-9 (book only)	$19.95	________
☐ Rainbow Guide to OS-9 Disk Package (2 disks)	$31.00	________
☐ The Rainbow Book of Adventures (first)	$ 7.95	________
☐ Rainbow Adventures Tape (first)	$ 7.95	________
☐ The Second Rainbow Book of Adventures	$13.95	________
☐ Second Rainbow Adventures Tape	$13.95	________
Kentucky residents add 5% sales tax		________
Add $1.50 per book Shipping and Handling in U.S.		________
Outside U.S., add $4.00 per book		________
(Allow 6 to 8 weeks for delivery)	Total	________

Name ________________
Address ________________
City ________________
State ________________ ZIP ________
☐ Payment Enclosed, or ☐ Charge to:
☐ VISA ☐ MasterCard ☐ American Express
Account Number ________________
Card Expiration Date ________________
Signature ________________

Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.

Please note: The tapes and disks offered by The Rainbow Bookshelf are not stand-alone products. That is, they are intended to be an adjunct and complement to the books. Even if you buy the tape or disk, you will still need the appropriate book.

OS-9® is a registered trademark of the Microware Systems Corporation.

To order by phone (*credit card orders only*) call 800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 502-228-4492.

Listing 3: `clock3`

```
0000       REM *
0004       REM * clock3
000F       REM * draw the hour numbers
0029       REM *
002D       REM * define the variables to use
004D       REM *
0051       DIM x1,y1,x2,y2,a:INTEGER
0068       REM *
006C       REM * set drawing mode to "store"
008C       REM *
0090       SHELL "display 1b 2f 00"
00A4       REM *
00A8       REM * set the foreground color to "black"
00D0       REM *
00D4       SHELL "display 1b 32 00"
00E8       REM *
00EC       REM * the following data statements
010E       REM * define the roman numerals for
0130       REM * the 3, 6, 9 and 12 o'clock
014F       REM * positions
015D       REM *
0161       DATA 296,16,312,32
0173       DATA 312,16,296,32
0185       DATA 320,16,320,32
0197       DATA 336,16,336,32
01A9       DATA 292,16,340,16
01BB       DATA 292,32,340,32
01CD       DATA 440,87,480,87
01DF       DATA 440,103,480,103
01F1       DATA 444,87,444,103
0203       DATA 460,87,460,103
0215       DATA 476,87,476,103
0227       DATA 300,159,332,159
0239       DATA 300,175,332,175
024B       DATA 304,159,312,175
025D       DATA 312,175,320,159
026F       DATA 328,159,328,175
0281       DATA 160,87,192,87
0291       DATA 160,103,192,103
02A1       DATA 164,87,164,103
02B1       DATA 172,87,188,103
02C1       DATA 172,103,188,87
02D1       REM *
02D5       REM * start drawing
02E7       REM *
02EB       FOR a=1 TO 21
02FB         READ x1,y1,x2,y2
030C         RUN gfx2("line",x1,y1,x2,y2)
032C       NEXT a
0337       REM *
033B       REM * finished, "chain" to run
0358       REM *
035C       CHAIN "ex basic09 clock4"
```

```
0592        SHELL "display 1b 40 00 c9 00 5f"
05AF        SHELL "display 1b 4a 01 b7 00 9d"
05CC        REM *
05D0        REM * finished with the background,
05F2        REM * "chain" to the ticker
060C        REM *
0610        CHAIN "ex basic09 clock2"
```

Listing 2: clock2

```
0000        REM *
0004        REM * clock2
000F        REM * draw the tick marks around the face
0037        REM *
003B        REM * define the variables to use
005B        REM *
005F        DIM angle,color,x1,y1,x2,y2,x3,y3,a,b:INTEGER
008A        REM *
008E        REM * initialize the variables
00AB        REM *
00AF        x1=320
00B7        y1=95
00BE        color=1
00C5        DEG
00C7        REM *
00CB        REM * set the drawing mode to "XOR"
00ED        REM *
00F1        SHELL "display 1b 2f 03"
0105        REM *
0109        REM * draw the ticks
011C        REM *
0120        FOR a=0 TO 11
0130          FOR b=0 TO 4
0140            angle=a*30+b*6
0152            x2=SIN(angle)*191
0161            y2=COS(angle)*95
0170            IF b=0 THEN
017C              x3=SIN(angle)*165
018B              y3=COS(angle)*82
019A            ELSE
019E              x3=SIN(angle)*175
01AD              y3=COS(angle)*87
01BC            ENDIF
01BE            color=color+1
01C9            IF color=8 THEN
01D5              color=1
01DC            ENDIF
01DE            RUN gfx2("color",color)
01F0            RUN gfx2("line",x1+x2,y1-y2,x1+x3,y1-y3)
021C          NEXT b
0227        NEXT a
0232        REM *
0236        REM * end of ticker, "chain" to numbers
025C        REM *
0260        CHAIN "ex basic09 clock3"
```

WE'VE OUTDONE OURSELVES!

NEW

DS-69A DIGISECTOR™
THE VIDEO DIGITIZER NOBODY CAN BEAT!

The DS-69A is the best video digitizer available for your COCO at any price. This new, turbocharged version of our original DS-69 Digisector allows your 64K COCO to see clearly into the world of any television picture.

SPEED!	The fastest — 8 images per second!
PRECISION!	The highest — 64 levels of true grey scale!
RESOLUTION!	The finest — 256 × 256 picture elements!
Compabitibility	Use with a black and white or color camera, a VCR or tuner.
Compactness	Self contained in a plug in Rompack.
Convenience	Use with a Y-cable, Multi-Pak, PBJ Bus or plug directly into the cartridge slot.
Ease of Use	Software on disk will get you up and running fast!

POWERFUL C-SEE™ SOFTWARE

C-SEE is the menu driven software package included with your DS-69A. Available on disk or cassette, it provides lightning fast 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout and simple keyboard or joystick control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS—69A may be saved on disk or cassette by C-SEE and then edited with COCO MAX, MAGIGRAPH or GRAPHICOM for special effects. Any of the popular printers may be used to obtain printouts of images digitized by the DS-69A.

ONE YEAR WARRANTY

DS-69A Digisector & C-SEE III Software	$149.95
OR your DS-69 &	$ 59.95
MAGIGRAPH Graphics Editor on disk	$ 39.95

DS-69 DIGISECTOR™
THERE'S ONLY ONE BETTER VIDEO DIGITIZER...

And that's the DS-69A. The DS-69 is The Micro Works' original video digitizer, tried and true since 1984. It provides almost all the features of the DS-69A and is now available at a new low price. **The DS-69 features;**

SLUGGISHNESS	2 images per second. Quick enough to freeze all but the fastest moving pictures.
INCOMPATIBILITY	Brightly colored scenes may be striped when using a color camera.
INCONVENIENCE	Will not work with a Y cable.

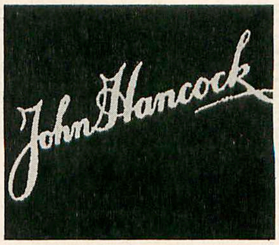
Otherwise, it's a DS-69A. Precision, resolution, compactness, ease of use, software and warranty.
Except one last thing.

DS-69 Digisector & C-SEE III Software	$ 99.95

Superb image quality produced by both Digisectors.

Printout

Screen



Screen

NO RISK GUARANTEE

If you are not completely satisfied with the performance of your new DS-69A or DS-6 you may return it, undamaged, within ten days for a full refund of the purchase pric We'll even pay the return shipping. If you can get any of our competitors to give yo the same guarantee, buy both and return the one you don't like. We know which on you'll keep.

THE MICRO WORKS
Purveyors of Fine Video Digitizers Since 1977.

Terms: Visa, Mastercard, Check or C.O.D.

P.O. Box 1110 Del Mar, CA 92014 (619) 942-24

```
026B        REM * for the next circle
0283        REM * circle 1
0290        REM *
0294        SHELL "display 1b 50 00 bf"
02AB        SHELL "display 1b 4f"
02BC        SHELL "display 1b 32 06"
02D0        REM *
02D4        REM * circle 2
02E1        REM *
02E5        SHELL "display 1b 50 00 77"
02FC        SHELL "display 1b 4f"
030D        SHELL "display 1b 32 05"
0321        REM *
0325        REM * circle 3
0332        REM *
0336        SHELL "display 1b 50 00 66"
034D        SHELL "display 1b 4f"
035E        SHELL "display 1b 32 04"
0372        REM *
0376        REM * circle 4
0383        REM *
0387        SHELL "display 1b 50 00 55"
039E        SHELL "display 1b 4f"
03AF        SHELL "display 1b 32 03"
03C3        REM *
03C7        REM * circle 5
03D4        REM *
03D8        SHELL "display 1b 50 00 44"
03EF        SHELL "display 1b 4f"
0400        SHELL "display 1b 32 02"
0414        REM *
0418        REM * circle 6
0425        REM *
0429        SHELL "display 1b 50 00 33"
0440        SHELL "display 1b 4f"
0451        SHELL "display 1b 32 01"
0465        REM *
0469        REM * circle 7
0476        REM *
047A        SHELL "display 1b 50 00 22"
0491        SHELL "display 1b 4f"
04A2        SHELL "display 1b 32 00"
04B6        REM *
04BA        REM * circle 8
04C7        REM *
04CB        SHELL "display 1b 50 00 11"
04E2        SHELL "display 1b 4f"
04F3        SHELL "display 1b 32 07"
0507        REM *
050B        REM * this section draws a white "bar"
0530        REM * over the bottom half of all the
0554        REM * circles, leaving the upper half as
057B        REM * the "rainbow."
058E        REM *
```

Editor's Note: To modify these routines for operation on a 128K CoCo 3, follow these steps:

1) **Delete the `merge` and `shell` lines from *window1* and do not use the procedure file to create window 1 yet.**
2) **Start BASIC09 and enter the listings. On *clock1, clock2* and *clock3*, however, do not enter the `chain` command lines which appear at the end of each of these listings.**
3) **Use `pack` to place each of the four clock listings in your CMDS directory.**
4) **Type `chd/d0/cmds` and press ENTER. Then enter the following command line:**

```
merge clock1 clock2 clock3
clock4 runb>/d0/clocks ENTER
```

Then type `chd/d0` and press ENTER.

5) **Enter the following command line:**

```
attr /d0/clocks r e w pr pe pw ENTER
```

6) **Type `window1` and press ENTER to create window 1.**
7) **Enter `load /d0/clocks` and then enter the following commands while still in the normal window:**

```
clock1>/w1 ENTER
clock2>/w1 ENTER
clock3>/w1 ENTER
clock4>/w1& ENTER
```

8) **Now you may use the CLEAR key to enjoy your CoCo clock. Keep in mind, because of the graphics memory requirements, you will not have any working memory left while the clock is running.**

Listing 1: `clock1`

```
0000     REM ******************************
0021     REM * RainbowTime
0031     REM *
0035     REM * Programmed by Greg L. Zumwalt
0057     REM *
005B     REM ******************************
007C     REM *
0080     REM * clock1
008B     REM * draw the clock face background
00AE     REM *
00B2     REM * set the drawing mode to "store"
00D6     REM *
00DA     SHELL "display 1b 2f 00"
00EE     REM *
00F2     REM * set the foreground color to "white"
011A     REM *
011E     SHELL "display 1b 32 07"
0132     REM *
0136     REM * set the background color to "blue"
015D     REM *
0161     SHELL "display 1b 33 04"
0175     REM *
0179     REM * clear the screen
018E     REM *
0192     SHELL "display 0c"
01A0     REM *
01A4     REM * place the draw pointer in the center of the screen
01DB     REM *
01DF     SHELL "display 1b 40 01 40 00 5f"
01FC     REM *
0200     REM * the following "circle" sequences
0225     REM * draw a circle, then fill it,
0246     REM * then change the foreground color
```

RainbowTime to run; eliminating them will save typing time). After you enter the last line, type:

```
q
```

This puts you back in the BASIC09 command mode. Continue by typing:

```
save
kill
```

The *clock1* program is now on the disk, and BASIC09 is ready for *clock2*. Follow the same procedure for entering the *clock2, clock3* and *clock4* programs substituting *clock2, clock3* and *clock4* as the name of the program to edit.

Running *RainbowTime*

Now that the four *RainbowTime* programs have been entered and saved on the disk, we start the clock by typing in the following:

```
kill
load clock1
run
```

You see the clock being built, one section at a time, and as one program chains to the next, you see the name of the next program appear on the screen. When *clock4* begins, three hands appear (hours, minutes and seconds) with the second hand moving as each second passes.

Each of the four *RainbowTime* programs use OS-9 Level II graphics commands in drawing the various parts of the clock. As you can see in the program listings, there are a variety of methods available to send these commands (SHELL, PRINT CHR$, etc). The *RainbowTime* programs intentionally use the various methods for the purpose of illustration. Examine each method carefully, as each has its own advantages and disadvantages.

The clock face is created by the programs *clock1, clock2* and *clock3.*

Clock1 starts the drawing of the clock face by setting the screen background to blue, drawing a white circle, then filling it. It then draws seven smaller concentric circles, filling each in a different color. Finally, the `BAR` command is used to erase the lower half of the seven smaller circles, leaving the upper half as the rainbow. Notice that *clock1* uses `SHELL "display . . . ."` to send graphic commands. *Clock1* finishes by performing the chain to *clock2.*

Clock2 draws the tick marks on the clock face. After initialization, a dual `FOR/NEXT` loop is entered. The two loops draw four short tick marks and one long tick mark (for the hours) around the outside edge of the clock face, 12 times. Notice that *clock2* uses the command `RUN GFX2` to set the foreground color and draw the tick mark lines. This method of issuing graphic commands uses the BASIC09 graphics interface module GFX2. The end result is the same; however, the GFX2 method requires the GFX2 module in memory, thus leaving less for your programs. *Clock2* finishes by performing the chain to *clock3.*

Clock3 draws Roman numerals at the 3, 6, 9 and 12 o'clock positions using `LINE DRAW` commands. The data statements contain the starting and ending points for each line in each Roman numeral. A `FOR/NEXT` loop reads the data statements and sends them to GFX2 as line drawing commands. *Clock3* finishes by performing the chain to *clock4.*

Time Keeping for *RainbowTime*

Clock4 is the run time program of *RainbowTime.* After declaring and initializing variables and setting up for screen drawing, a loop is entered that performs the time keeping function.

The `WHILE` statement waits for the time to change by comparing the time with the string variable GETTIME. If the current time is different from GETTIME, the current time is copied to GETTIME and a conversion process from string to integer begins.

The integer time is saved in the three-element array, TIME. The three elements in the array represent seconds, minutes and hours, respectively. The seconds and minutes are simply converted from string to integer. However, the hours are modified. The hours are first multiplied by five to place them in the range of five to 60, like the seconds and minutes (this is so the hand drawing subroutine at Line 10 can use the same equation for determining where the hands should point). Then, the value (minutes/12) is added to hours. This gives the hour hand five distinct positions between the hours tick marks.

The time array is then compared element by element with a second three-element array, LASTTIME. If a difference is found, the hand associated with the difference (seconds, minutes and/or hours) is erased from the LASTTIME position and drawn at the LASTTIME =TIME position.

The subroutine at Line 10 converts the zero to 60 value passed to it in the LASTTIME(COUNT) element to the zero to 360 degree angle, ANGLE. ANGLE, using the BASIC09 SIN and COS functions, defines the X and Y endpoints (X2 and Y2) of the clock hand using radius as the vector length. The origin of the hand (X1 and Y1) is always in the center of the clock. Note that radius is set to 120 if COUNT equals three, otherwise it is set to 160. (When COUNT equals three, the hours variable is being redrawn, so the hand is shorter.)

So there you have it — *RainbowTime.* What if you decide it would be nice to have *RainbowTime* on the screen while you work on other programs in another window, but on the same screen? Well, this requires a scaled down version of *RainbowTime*, designed for a smaller window.

What? You don't want to type in the entire program again changing each and every data value? I don't blame you. Refiguring all of those values for a smaller window would take hours!

Well, relax, OS-9 Level II and the windowing system come to the rescue. The windowing system's scaling mathematics convert the 640-by-192 screen coordinates of *RainbowTime* into whatever size window you define, automatically! Whenever you design a program that generates graphics, always base the graphic coordinates on the 640-by-192 screen size. Then, OS-9 will properly scale the coordinates for any size window your program is run on.

Experiment With *RainbowTime*

I hope you enjoy *RainbowTime.* It was designed to illustrate the use of a wide variety of the OS-9 Level II graphics commands.

Try running *RainbowTime* on a different size window, or even a different graphics screen type. Experiment with the colors and the color palette. Try adding the remaining hour numbers. Add an alarm function by comparing GETTIME with a date/time string the user can enter.

Remember, *RainbowTime* is running as *one* task on a *multi-tasking* computer system. This means that *RainbowTime* can run while you do other programming. By experimenting, you will see how easy it is to create your own powerful multi-tasking environment using Microware's OS-9 Level II, BASIC09, windows and graphics on the Tandy CoCo 3. ☐

RAINBOW ON TAPE

Those Great RAINBOW Programs Without All The Fuss! Subscribe to RAINBOW ON TAPE!

Every month, RAINBOW ON TAPE brings as many as two dozen ready-to-run programs right to you. Using the current issue of THE RAINBOW as documentation, all you have to do is load and run them. Just a one-year subscription gives you more than 230 new programs! The typing time saved is time that can be spent with the CoCo. (RAINBOW ON TAPE does not include OS-9 programs or those less than 20 lines.)

Need a back issue of RAINBOW ON TAPE? Issues available beginning with April 1982

Subscribe to RAINBOW ON TAPE Today!

LOOK FOR OUR ORDER CARD BETWEEN PAGES 34 AND 35

The cost for a single copy of RAINBOW ON TAPE is $10 within the United States; U.S. $12 in all other countries. The annual subscription rate for RAINBOW ON TAPE is $80 within the U.S.; U.S. $90 in Canada; and U.S. $105 for all other countries. **U.S. currency *only*, please**. In order to hold down non-editorial costs, we do not bill.

DISK USERS: RAINBOW ON DISK IS NOW AVAILABLE!

All the programs from THE RAINBOW — including OS-9 — are now available on disk. For more information, see page 159 of this issue.

NOW AVAILABLE ON DELPHI!

For your convenience, RAINBOW ON TAPE can also be ordered via the Delphi Information Network, in our Shopping Service area of THE RAINBOW's Color Computer SIG (Special Interest Group).

The individual programs from our past November issues are also available for immediate download in the RAINBOW ON TAPE Database area in THE RAINBOW's Color Computer SIG on Delphi. There is a $3.50 per program surcharge.

RAINBOW ON TAPE is not a stand-alone product, but is intended as an adjunct and complement to the magazine. Even if you purchase RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions.

To order by phone, (*credit card orders only*) call 800-847-0309, 8 a.m. - 5 p.m. EST. All other inquiries call 502-228-4492.

Programs from Our Past Telecommunications Issues:

November 1985 — *Computer Trapshooting*, a game that simulates the real-life sport of skeet shooting; *XFER16*, a communications program for transferring files over telephone lines; *C-QSL*, a Ham utility that logs entries and writes out QSL cards; *Remote2*, an enhanced version of *Remote*, a remote terminal driver published in the November 1983 Communications Issue; *Horse*, a two-player Simulation of the popular basketball game; *CoBBS*, part one of a complete bulletin board system; *Screen Pokes Made Easy*, several programming utilities that demonstrate how to hide credit lines in poke statements; *Little Black Book*, a personalized phone and address directory; *Coax*, a Ham utility that determines the various factors related to transmission line loss; *BASIC Training*, creates jargon from Latin prefixes, roots and suffixes; and *Education Notes*, demonstrates the uses of Radio Shack's Electronic Learning Book and a number-matching game for preschoolers.

November 1984 — *EZ List*, a utility that allows the use of arrow keys to list program lines one at a time; *The Message Center*, a bulletin board for saving and displaying messages at home; *Road Race*, a game for racing fans in which you must finish a given driving course without blowing your engine; *RainBoard*, programs to help set up a BBS; *CC-Talk*, a smart terminal package; *Junkfood*, a game in which you eat all the "edible" foods to gain points; *Handler*, the first of three parts on disk file organization; *CLOAD Command Fixer*, a tape utility that searches for the end of a file; *Personal Savings*, a personal savings and loan calculation program; and *DosStart*, a disk utility to store a BASIC command in Drive 0 and have it executed by typing DOS.

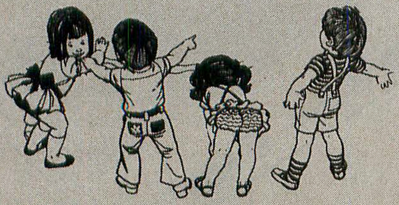
Computer Island Educational Software

ARROW GAMES
32K Ext. - $21.95 tape/$26.95 disk

Six menu driven games for young children (ages 3-6) to teach directions. All games involve using the arrow keys ONLY. Games include: LADYBUG, BUTTERFLY, ARROW MATCH, KALEIDOSCOPE, RABBIT, and DOODLE. Colorful graphics.

FIRST GAMES
32K Ext. - $24.95 tape/$29.95 disk

First Games contains 6 menu driven programs to delight and teach your early learners (ages 3-6). These games enrich the learning of colors, numbers, lower case letters, shapes, memory, visual discrimination and counting.



CLOZE STORIES
32K Ext. - $19.95 Tape/$24.95 Disk

These programs give students practice using the popular CLOZE reading technique. Each program contains grade appropriate short stories with key missing words to be deduced by the student. Available for grades 3, 4, 5, 6, OR 7. Please specify.

DRAWING CONCLUSIONS
32K Ext. - tape $19.95/disk $24.95

These programs contain short stories. Each story has two accompanying questions that ask the student to draw conclusions from the text. Available for grades 3-4 OR 5-6. Please specify.

LOCATING STORY DETAILS
32K Ext. - disk only - $24.95

These programs contain short stories. Each has an accompanying picture. Questions about story details refer to either the text or pictures. The disk generated graphics are an integral part of these attractive programs. Available for grades 2-3 OR 4-5. Please specify.

FOREIGN LANGUAGE GAMES
32K Ext. - $19.95 tape/$24.95 disk
(500 words)

French or Spanish Baseball

Score base hits or home runs for correct answers. You're out if wrong. Correct answers supplied. Fun way to learn and practice vocabulary. PLEASE SPECIFY LANGUAGE.

PUNCTUATION PRACTICE
32K Ext. - tape $19.95/disk $24.95

On screen practice in proper usage of the familiar punctuation marks. Grades 3-7.

265
×15
1325
265
3975
×40 160
9|420

MATH TUTOR SERIES
16K Ext.

These tutorials take the child through each step of the example. All programs include HELP tables, cursor and graphic aids. All allow user to create the example, or let the computer choose. Multi-level. Great teaching programs.

LONG DIVISION TUTOR
$14.95 tape/$19.95 disk
MULTIPLICATION TUTOR
$14.95 tape/$19.95 disk
FACTORS TUTOR
$19.95 tape/$24.95 disk
FRACTIONS TUTOR (addition)
$19.95 tape/$24.95 disk
FRACTIONS TUTOR (subtraction)
$19.95 tape/$24.95 disk
FRACTIONS TUTOR (mult.)
$19.95 tape/$24.95 disk

COMPUTER LITERACY
32K Ext. - $19.95 tape/$29.95 disk

A computer literacy quiz exclusively for the Color Computer. Tests and scores from over 60 questions on a Hi-res upper and lower case screen. Reviews computer literacy and beginning programming knowledge. Ages 10 and up.

RAINBOW
CERTIFICATION
SEAL

Computer Island

(718) 948-2748

VISA

Dept. R 227 Hampton Green, Staten Island, N.Y. 10312

MasterCard

Send for catalog with complete descriptions.

Please add $1.00 per order for postage. N.Y. residents, please add proper tax. FREE set of BINARY DICE, including full directions, with orders of 2 or more items.

Dealer Inquiries Invited.

TRS-80 Color Computer

All Payments in U.S. Funds.

Living on Rainbow Time

By Greg L. Zumwalt

I have been using the CoCo 3 for quite some time now. I must say, my enthusiasm for this machine hasn't waned a bit. I've seen a variety of benchmarks comparing machine X with machine Y using "mflops," "FFTs," etc. Well, I've got my own benchmark for computers that reads: The power of a computer is directly proportional to the length of time it holds my attention.

And that's the reason for *Rainbow-Time*. *RainbowTime* is a real-time analog clock that remains on the CoCo 3 screen while I work (to remind me that after 12-14 hours of CoCo 3 experimenting, its time to sleep).

In our previous window discussion, "The Color Computer 3 Does Windows, and More" (September 1986, Page 20), we created examples of windows using text only output. This time, we'll put the CoCo 3 into high gear and experiment with the graphics displays.

OS-9 Level II Graphics

The OS-9 Level II windowing system supports six screen types summarized in Figure 1.

Using the DWSET command (the "create a device window" command), the user has the choice of any of the six available screen types.

Notice that screens five, six, seven and eight are graphics screens. In our last discussion on windows, we used Screen 7, a graphics screen, as a text display by merging a graphics character set with it. This time, we're using Screen 8, again merged with a character set, but also including the use of some of the OS-9 Level II graphics commands.

BASIC09 and Chains

RainbowTime is written as four separate BASIC09 programs. The first three build the "static" portion of the clock; the last is the running portion. Each program performs a specific task, and when finished, calls the next. This process continues until the fourth program is called and the clock begins running.

In BASIC09, the process of calling programs in this manner is called chaining. The advantage of chaining is that when a program has completed its task, it can be erased, and the next program loaded in its place. In our example, once the clock face has been created, the programs that created it are no longer required. By using chaining, these programs are removed from memory, leaving more memory for other tasks.

Getting Started

We need to create a type eight device window. Remember the OS-9 build command? We will use it to build a procedure file to create the window. At the OS-9 prompt, enter the following:

```
build window1
iniz w1
merge sys/stdfonts >/w1
display 1b 20 08 00 00 28 18 07
  00 00 >/w1
shell i=/w1&
```

After the last line, press ENTER twice. When the OS-9 prompt appears, continue by typing:

```
window1
```

When the OS-9 prompt appears this time, press the CLEAR key, and Device Window type eight appears on the screen. We are now ready for BASIC09.

The four BASIC09 programs that create *RainbowTime* are entered and saved on the disk individually. To do this, we must first enter BASIC09. From the OS-9 prompt on Window 1 type:

```
basic09 #12k
```

This loads BASIC09 into the CoCo 3 and allocates 12,000 bytes of memory for us to use.

Now we will enter the *clock1* program. At the BASIC09 prompt on Window 1 type:

```
e clock1
```

This tells BASIC09 the name of the program to edit, *clock1*. BASIC09 responds with a PROCEDURE clock1 followed by the BASIC09 edit prompt. Proceed from here by carefully typing in the *clock1* program shown in Listing 1 (the programs contain many REM statements that are not necessary for

An independent programmer and computer designer, Greg Zumwalt is one of the select few writing Tandy software for the new Color Computer 3. He owns ZCT Software of Tulsa, Oklahoma.

Number	Size	Color	Memory	Type
01	40 by 24	8 & 8	1600	Text
02	80 by 24	8 & 8	4000	Text
05	640 by 192	2	16000	Graphics
06	320 by 192	4	16000	Graphics
07	640 by 192	4	32000	Graphics
08	320 by 192	16	32000	Graphics

Figure 1: Screen Types

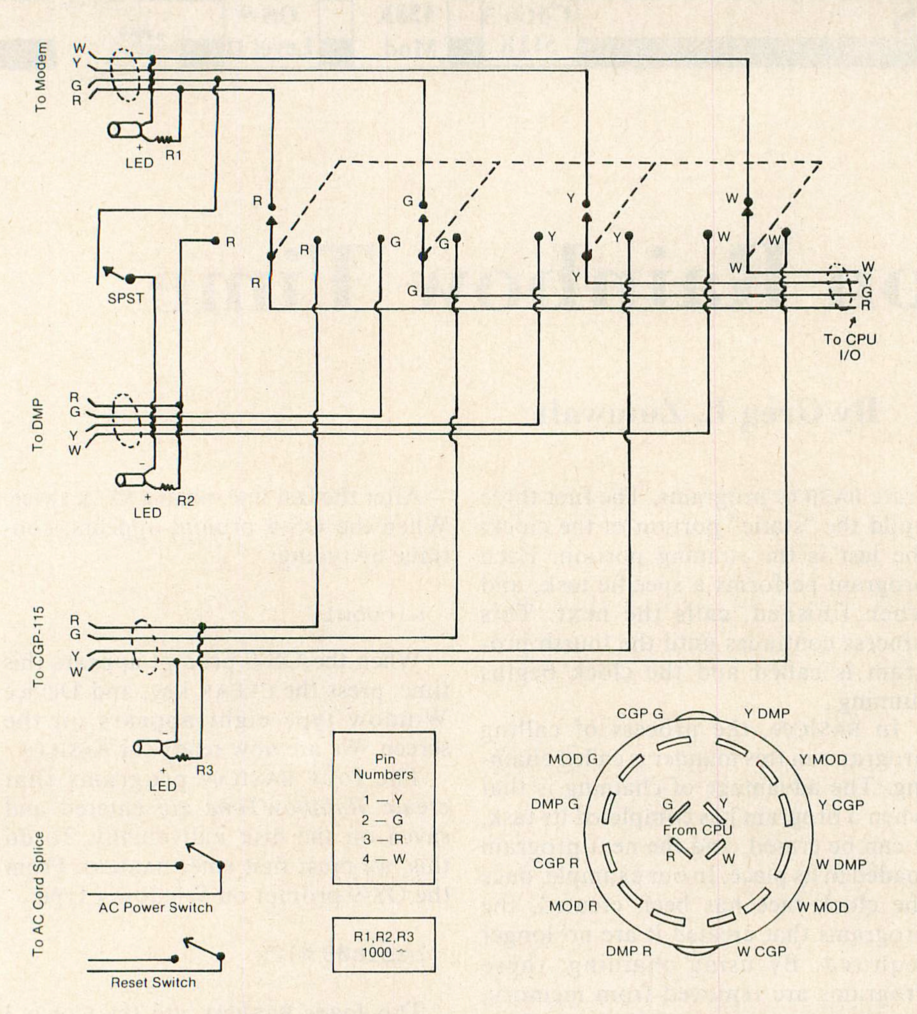

To Modem
W
Y
G
R
LED
R1
SPST
R
G
Y
W
To CPU I/O
To DMP
R
G
Y
W
LED
R2
To CGP-115
R
G
Y
W
LED
R3
Pin Numbers
1 — Y
2 — G
3 — R
4 — W
To AC Cord Splice
AC Power Switch
Reset Switch
R1,R2,R3
1000 ~
CGP G
Y DMP
MOD G
Y MOD
DMP G
Y CGP
From CPU
CGP R
W DMP
MOD R
W MOD
DMP R
W CGP

Figure 4: Four-Pole, Three-Position Rotary Switch

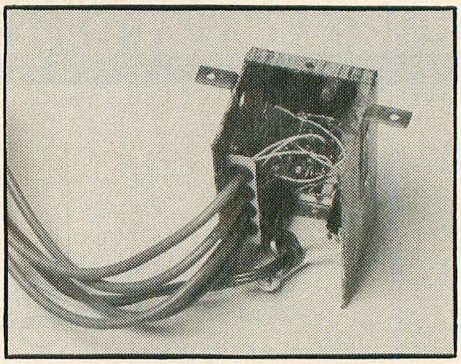


Figure 3

computer again, so I figured out another way to connect the A/C on/off switch. I opened up one lead of the power cord and, using "wire nuts," spliced the leads from the remote switch. Also shown is the two-prong miniature plug which connects the remote Reset switch to the internal Reset switch. These can be seen in Figure 2.

The cables I used are serial printer and modem interface cables, Radio Shack part number 26-3020. For my purposes, cutting two cables gave me the required four needed to interconnect the two printers and the modem to the CPU. Figure 3 shows an inside view of the completed switcher.

Finally, I dressed up the box with some scraps of the contact paper I used when I built my computer table, which blends it in and gives it a finished appearance.

I haven't been using this device too long; however, I can already say that I wish I had built it sooner because it's a real convenience. In particular, I like having the A/C power and Reset switches located where they are easy to reach.

(Questions about this project may be directed to the author at 8350 East McKellips Road, Apt. 111, Scottsdale, AZ 85257. Please enclose an SASE for a reply.)

DARN!... COME ON NOW!.. EASY!... EASY!
OOPS! OMIGOSH!
AH-HAH! EUREKA!... GOT IT!
I JUST LOVE ALL THIS COMPUTER TALK!
McKIERNAN 11/86

The Super Switcher

By Robert C. Merryman

This device incorporates several features which, individually, have been described in the past, but not in this combination or format. Collectively, they are very useful in conjunction with the CoCo.

It started out as a simple switching device consisting of a four-pole, three-position rotary switch and a 2 by 2 by 2¼ inch mini-box built to switch the computer serial I/O port between my modem and CGP-115 graphics printer. Later, when I acquired a dot-matrix printer, it became necessary to switch three peripherals.

Then an article was published in THE RAINBOW (October 1984) which described how to connect the modem and printer by a switch, so what was fed into the computer from the modem would also drive the printer making a hard copy of what appeared on the screen. This seemed like a good idea and I decided to add that feature to the switcher, along with three LEDs to indicate which peripheral was connected to the computer's I/O port.

Since one of the three LEDs would always be lit when the computer was on, it would also serve as an on/off indicator. The idea seemed to grow, and before long I decided I would add remote control switches to control the computer on/off and reset functions.

The original mini-box was now much too small, so I obtained a larger box which measured 4 by 2¼ by 2¼ inches. The rotary switch, mentioned before, came out of my junk box. The LEDs are Radio Shack part number 276-018 — they come two to a package. The AC power on/off switch is a Radio Shack square push putton switch (push-on/push-off) rated at 3 amps, and is part number 275-617. The Reset switch is a Radio Shack square push-button switch (part number 275-618). The SPST toggle switch also came from the junk box, but any switch will work. The rubber grommets, miniature two-prong connector, together with the scrap metal for the mounting brackets and cable holding shelf, were also from the junk box.

Figure 1 illustrates the completed device mounted under the shelf and to the right of the keyboard, by means of two L brackets. The three LEDs are labeled "CGP," "MOD" and "DMP" (color graphics printer, modem and dot-matrix printer, respectively). Below the knob, on either side of the toggle switch, are labels "P/M" and "OFF" (printer and modem connected, or off). Beneath the two push-button switches are labels reading "A/C PWR," on the left side, and "RESET" on the right. The labels were made with a Dymo label maker.

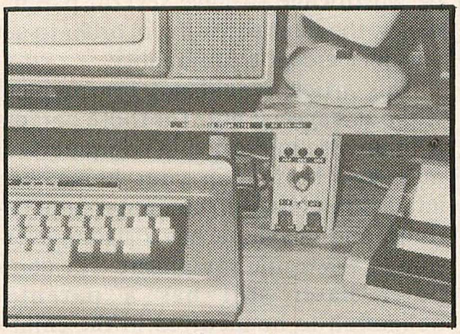


Figure 1

Figure 2 illustrates how the cables are fed through the rear of the box, through loosely fitting grommets, to allow removal of the back cover for access to the parts. I labeled the cable alongside of the grommet so I wouldn't get confused while wiring the device. To hold the end of the cables in the box so there would be no strain on the wires, I used a small piece of aluminum bent into a 90 degree angle. Holes were then drilled to receive the four grommets, which were sufficiently small to really grab the cable tightly. The bracket is fastened to the side wall of the box by means of pop-rivets. After stripping off about two inches of the outer covering from the cable, I pushed the cable end into its proper grommet (lined up with grommets on back cover) and with a twisting motion, pushed the cable through just far enough to have the outer cover show beneath the grommet. This was done one cable at a time, soldering the four connections before proceeding to the next cable.

The two zip-cord wires going to the A/C and Reset switches, are also fed through grommets in the back of the box and then tied in a knot to prevent them from being pulled out. They are then soldered to their respective switches.

Before I completed the switcher, I replaced the keyboard with an upgraded board (Figure 1 was taken before the upgrade). While the case was open, I soldered the miniature two-prong plug leads (female end) to the internal Reset switch using the two terminals on the right side and closest to the front of the computer. After securely soldering the wires to the Reset switch terminals, I fed them out of the case under the Reset switch button. There was plenty of room without having to cut or drill the case.

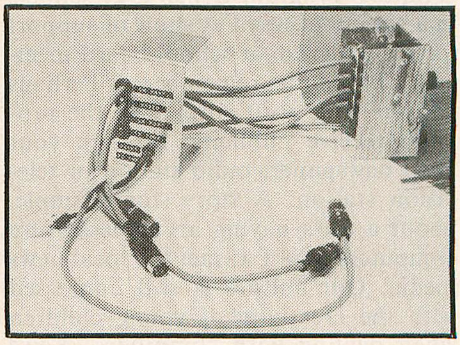


Figure 2

When I finally finished my switcher project, I didn't feel like opening the

Bob Merryman has been a licensed Ham Radio operator for the past 50 years and has built many pieces of electronic equipment. Two years ago he added computing to his list of hobbies and has built several items associated with this hobby, too.

Group activities are wonderful things, but individual parental activities can be very helpful also. Of course, encouragement for your own child is necessary. Parents should encourage their children to learn on the computer, and to engage in a variety of activities, not just playing Simulation games or programming in BASIC. I assume that most people reading this have a Color Computer in the home. A home computer is helpful for the school child, but not really needed. Parents can provide encouragement by looking at work brought home from school, suggesting after-hours projects for their child, and a host of other activities limited to the school computer. A home computer is simply an added attraction, although one I would strongly recommend.

> ***"Just as education begins with parents, so it can also end with parents."***

Encouragement, however, does not need to stop with your own child. Parents can provide encouragement for their local computer education program and for the school. A simple note delivered to school expressing your encouragement will go a long way toward staff morale. Just like you, teachers like to receive recognition for their efforts.

Parents can show support for the computer program in their local schools in a variety of ways. A show of support for the program at school board meetings will long be remembered. Perhaps you are in a position to help the program receive publicity, through your local newspaper, radio station or television station. A story, for example, about a class having an art lesson on computers might attract the local news media. Our culture is still impressed with the creativity of young children when dealing with computers. News reporters love to interview a child who uses jargon terms to explain what a computer program does.

Perhaps you are in a position to arrange a field trip for a class to a computer facility, or a business that uses computers. Perhaps your own business uses computers in ways that would be interesting for a field trip. This type of lesson can tie in well with a career awareness activity, and might be welcomed by school people.

You can contribute time to your school, without having a major event like a field trip. You might volunteer to do a presentation on the way you use your computer. If you use a microcomputer in some unusual way, your school might enjoy a visit from you to explain your particular application.

Parents can contribute more than time and funds raised through a group. You can contribute your expertise (and your own child's expertise) by such things as reviews of programs. Reviews by parents might be especially important for any software purchased by a PTA. Teachers, even when they have the monetary resources for reviews, are hard pressed to find time to provide adequate reviews for all educational software available today. Parents can help screen software, and provide a focus for teacher reviews. In fact, it may be worthwhile to have several parents review the same software, in order to get a wider perception of quality.

This article would not be complete without a special note for those parents who are *not* interested in computers. It may well be that in your home, one adult is interested in computer applications, and one adult has a strong aversion to electronic equipment. The computer hater still has a parental obligation to be involved in the child's education. If you are such a person, and forced to read this by a loving spouse, please realize that when your children are older, they will have to be more involved with machines than you. You can still provide support for your child's computer education, without having to touch a keyboard. Go ahead, get involved with the computer program, even if not with the computer.

Just as education begins with parents, so it can also end with parents. Parents cannot help but demonstrate their attitudes toward education. With the right attitudes and behaviors, children will realize that education is a life-long effort, not something that ends with formal schooling. Computer learning should not end with formal schooling, any more than other areas of study.

Your comments, thoughts, suggestions are welcome. Please write me at 829 Evergreen, Chatham, IL 62629. Until next month, keep on learning, and demonstrating that learning never ends. Share the fun.

TANDY™
The Ideal Buy

COLOR COMPUTER 3
128K
$170.00*
26-3334

COLOR COMPUTERS
26-3127 Color Computer 2 64K
26-3131 Color Disk Drive 0
26-3512 CM-8 RGB Color Monitor
26-3012 Deluxe Joystick

TANDY™ 1000 SX
384K 2 Disk Drives
$840.00*
25-1051

TANDY™ 1000 COMPUTERS
25-1050 Tandy 1000EX 256K 1 Disk Drive
25-1020 VM-4 Monochrome Monitor
25-1022 CM-10 Color Monitor
25-1023 CM-5 Color Monitor

TANDY™ 3000 HL
360K Drive 512K
$1195.00*
25-4070

TANDY™ 3000 COMPUTERS
25-4001 Tandy 3000 1.2 Meg Drive 512K
25-4010 Tandy 3000 20 Meg Hard Drive 512K
25-4011 Tandy 3000 40 Meg Hard Drive 640K
25-4103 MS-DOS 3.2/Basic/Deskmate

EPSON™
FX-85
$385.00

EPSON™ PRINTERS
LX-86 Dot Matrix Printer 80 Column
FX-286 Dot Matrix Printer 132 Column
LQ-800 Dot Matrix Printer 80 Column
LQ-1000 Dot Matrix Printer 132 Column

PERRY COMPUTERS

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. C.O.D. accepted add 2% (minimum charge $10.00). M.C., Visa add 2%, AX add 4%. All non defective items require return merchandise authorization. Call for RMA Number before returning. Delivery is subject to product availability. Prices include shipping costs except for orders under $100.00 add $5.00 shipping and handling.
TM - Registered Trademark of Tandy, Epson, and IBM.
*Monitors not included

Monday thru Friday 9am - 6pm Saturday 9 am - 3pm EST.
124 South Main Street, Perry, MI 48872
CALL 1-517-625-4161 or TOLL-FREE
1-800-248-3823

The Most Important Educators of All

By Michael Plog, Ph.D.
Rainbow Contributing Editor

When we think of the process called schooling, we often think of people. Generally, the relationship between teachers and students is the first thought we have concerning the schooling process. Sometimes we expand those initial thoughts to include administrators. We know that principals are extremely important in a child's education. Upon further reflection, we all admit that program directors, central office administrators and superintendents are also crucial to the education process, even if never seen by a child.

In moments of rationality, we may even include all the support staff that helps to keep a school going. Bus drivers, lunchroom workers, and all the other people involved in education play a role (even if not immediately noticed) in the lives of children.

These are all very important, but we often ignore the most important people in the education of a child — parents.

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.

The education process begins with parents, long before the child goes to school. During the school years, parents shape the way a child approaches lessons, the classroom, teachers, the entire institution. The attitudes a child has toward school are heavily dependent on the behaviors of parents. Positive behaviors, in the form of interest and support, can help a child do well in school; behaviors showing a lack of interest are reflected in the child's lack of enthusiasm.

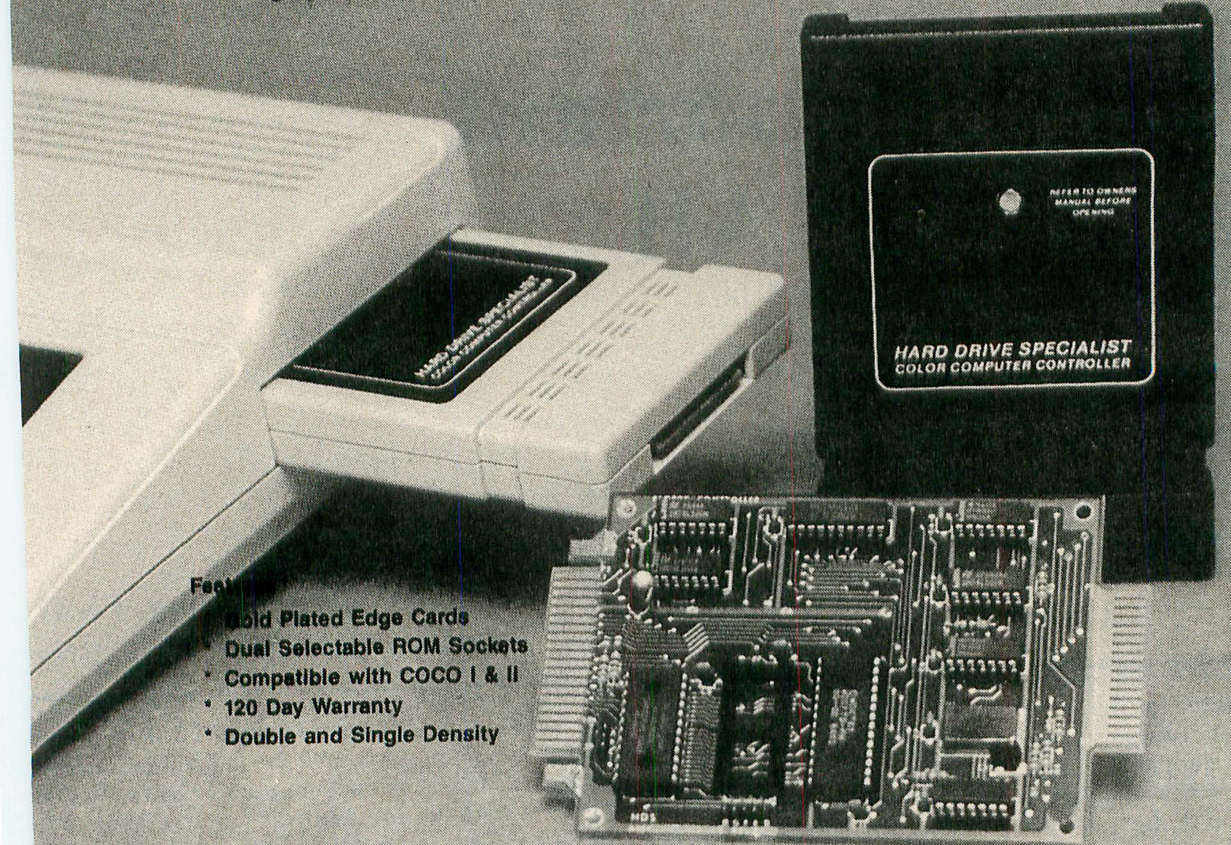
It is important for parents to realize that teachers have the best interests of the child in mind, even when parents disagree with teachers about those interests. Conversely, teachers should realize that parents also have the best interests of their child in mind, even when the two groups disagree. All players — parents as well as school personnel — have a role to play in the educational process. A parent ignoring that role diminishes the value of school for the child.

The importance of parents extends beyond the general notion of schooling to the more specific components of the educational system, such as computer education. What should the role of parents be in the area of computer education?

Some roles for parents include group activities; some are individual efforts. One obvious group activity is to provide funds for hardware and software for classes. Schools are always in need of materials. Tax dollars need supplementing for those things necessary for a quality education. Parent organizations, such as PTAs (Parent-Teacher Associations) raise funds for school use. Some of those funds could be directed toward computer hardware and software. Does the school need a new printer? How about a large television set or monitor connected to the classroom computer, so a demonstration can be viewed by more than a few students? I am positive that your school could use something in the way of computer equipment or supplies, possibly a hard disk or extra paper.

Football teams and marching bands have booster clubs of interested parents. What about the computer club? Does your community have a support group for the computer club? Does your school even have a computer club? Perhaps a discussion with school personnel would lead to the creation of such a support group. (A side thought — wouldn't it be interesting to have a bake sale with the prices listed in binary code?)

The Best Money Can Buy . . .
HDS Floppy Drive Controller Board


REFER TO OWNERS MANUAL BEFORE OPENING
HARD DRIVE SPECIALIST
COLOR COMPUTER CONTROLLER
HARD DRIVE SPECIALIST
COLOR COMPUTER CONTROLLER
HDS

Features:

- **Gold Plated Edge Cards**
- **Dual Selectable ROM Sockets**
- **Compatible with COCO I & II**
- **120 Day Warranty**
- **Double and Single Density**

Reduce your I/O errors with the Hard Drive Specialist Floppy Drive Controller for the Color Computer. Gold edge card connectors, advanced design, and the absence of potentiometers make it the best available. Our newest version controller allows the use of either (two 24 pin ROMS), or (one 24 pin and one 28 pin ROM). Using this board with the standard Radio Shack ROM gives you 100% compatibility with all Radio Shack software.

Completed and Tested Board with Radio Shack ROM (Includes Case, and DOS Instructions)	**$99.**
Completed and Tested Board without ROM (Includes Case)	**$79.**
Bare Board with Instruction manual	**$30.**
Parts Kit For Bare Board without ROM	**$30.**
Radio Shack ROM (current version)	**$20.**
Radio Shack ROM 1.0	**$40.**

DOUBLE SIDED!

Drive 0 Complete	$199.
Drive 1 Complete	$129.
Drive 0 & 1 Dual Drive	$319.

Ordering Information:

Use our WATS line to place your order via Visa, MasterCard, or Wire Transfer. Or mail your payment directly to us. Any non-certified funds will be held until proper clearance is made. COD orders are accepted as well as purchase orders from government agencies. Most items are shipped off the shelf with the exception of hard drive products that are custom built. UPS ground is our standard means of shipping unless otherwise specified. Shipping costs are available upon request.

HARD DRIVE SPECIALIST

1-713-480-6000
Order Line 1-800-231-6671
16208 Hickory Knoll
Houston, Texas 77059

```
20 IFC<>76450THENPRINT"DATA ERRO
R":STOP
30 PRINT@162,"IF YOU HAVE NOT AL
READY SAVED   STAR GETPUTPAINT,
DO SO NOW.
40 PRINT:PRINT"  OTHERWISE, TYPE
 CONT AND           PRESS ENTER."
50 STOP
60 X=256*PEEK(27)+PEEK(28)+699:A
=INT(X/256):B=X-256*A
70 POKE474,A:POKE475,B:POKE27,PE
EK(474):POKE28,PEEK(475):CLEAR
80 X=256*PEEK(27)+PEEK(28):M=X-6
99:FORI=M TOM+698:READD$:D=VAL("
&H"+D$):POKEI,D:NEXT
90 FORJ=0TO2:POKEM+7+J,PEEK(401+
J):NEXT:DEL10-
100 DATA 16,1,1B,81,AD,27,3,7E,C
2,4D,9D,9F,81,C4,27,4,81,C5,26,E
C,34,2
110 DATA 86,4,97,7C,9D,9F,BD,B7,
3D,34,10,BD,B2,6D,A,7C,26,F4,97
120 DATA 7C,9D,9F,E6,67,54,54,54
,E7,67,EC,62,54,54,54,E0,67,2B
130 DATA 3D,5C,DD,41,CC,20,20,D0
,42,D7,50,E6,65,3D,E3,66,D3,BA
140 DATA 1F,2,E6,61,E1,65,25,24,
C1,BF,22,20,E0,65,5C,D7,43,96,42
150 DATA 3D,DD,44,9E,27,30,1,A6,
80,91,7C,27,6C,84,C0,81,40,26,B
160 DATA EC,81,30,8B,20,EE,32,69
,7E,B4,4A,A6,68,81,C4,26,F5,10
170 DATA DF,7D,DC,21,93,7D,DD,7D
,DC,27,93,44,83,0,3,DD,27,DD,23
180 DATA DC,21,93,44,83,0,3,DD,2
1,93,7D,1F,3,9E,7D,DD,7D,35,4,E7
190 DATA C0,30,1F,8C,0,0,26,F5,1
0,DE,7D,DE,27,33,41,96,7C,A7,C0
200 DATA 9E,44,AF,C1,D6,42,A6,A0
,A7,C0,30,1F,5A,26,F7,8C,0,0,27
210 DATA 48,96,50,31,A6,20,EA,1F
,13,A6,68,81,C4,26,A,AE,C1,9C,44
,25,92,9E,44,20,D8
220 DATA 9E,44,33,42,9D,9F,81,B0
,27,7,81,B1,27,6,86,A6,8C,86,A4
230 DATA 8C,86,AA,A7,8C,4,D6,42,
A6,A4,A6,C0,A7,A0,5A,26,F7,A,43
240 DATA 27,6,96,50,31,A6,20,EB,
9D,9F,32,6B,39
250 DATA 81,C3,27,25,8B,79,81,AA
,27
260 DATA 7,44,81,55,10,26,FE,DE,
97,50,9E,BA,33,89,18,0,DF,51,9D,
9F,A6
270 DATA 84,98,50,A7,80,9C,51,26
,F6,35,90,86,3,97,7C,9D,9F,BD
280 DATA B7,3D,34,10,32,61,BD,B2
,6D,A,7C,26,F2,BD,B7,3D,9F,42
290 DATA 35,54,D7,42,D7,45,1F,10
,C6,20,3D,D3,BA,1F,3,1F,10,54
300 DATA 54,54,8D,2B,F,44,1F,32,
8D,11,3,7C,D6,50,8D,1F,33,A8,E0
310 DATA D6,43,D7,45,C6,FF,D7,44
,1F,31,DC,BA,C3,17,E1,DD,7D,9C
320 DATA 7D,25,1,39,1F,30,93,BA,
2A,9,1F,98,DD,50,5A,4C,DD,52,39
330 DATA D6,51,3A,A6,84,5C,D1,52
,26,59,5A,D1,53,26,17,81,FF,27
340 DATA EC,84,3,81,3,27,5E,A6,1
,81,FF,27,6,84,C0,81,C0,27,52,39
350 DATA 5A,D1,53,22,26,81,FF,27
,48,E6,1F,C1,FF,26,4,C,53,20,DA
360 DATA 84,C0,81,C0,26,8,A,51,A
,52,30,1F,20,30,A6,84,84,3,81,3
370 DATA 26,CA,20,26,81,FF,27,22
,A,51,30,1F,A6,84,81,FF,27,18,A
380 DATA 52,20,D2,5A,5A,D1,53,22
,E,81,FF,27,A,E6,1,C1,FF,26,A0,C
390 DATA 51,30,1,96,51,97,53,E6,
84,C1,FF,26,3C,D6,45,E7,84,30,1F
400 DATA A,53,2A,F0,D6,51,1F,31,
5C,3A,D7,52,E6,84,C1,FF,26,4B,D6
410 DATA 45,E7,80,C,52,C6,20,D1,
52,26,EE,33,C8,E0,D,7C,26,3,33
420 DATA C8,40,3,44,26,3,96,42,8
C,96,43,97,45,16,FF,26,E6,84,57
430 DATA 24,C9,57,24,C6,57,24,F,
57,24,C,57,24,C,57,24,9,E6,84,D4
440 DATA 45,20,9,C6,F0,8C,C6,C0,
DA,45,E4,84,E7,84,20,A7,E6,84,58
450 DATA 24,BC,58,24,B9,58,24,F,
58,24,C,58,24,C,58,24,9,E6,84,D4
460 DATA 45,20,9,C6,F,8C,C6,3,DA
,45,E4,84,E7,84,20,9A,16,FD,4B,0
,0,0
```

Listing 4: GETPUT4

```
1 REM *** STAR GETPUTPAINT ***
        BY H. ALLEN CURTIS
        COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
10 PMODE4,1:PCLS1:COLOR0,1:SCREE
N1,1
20 LINE(0,96)-(127,191),PSET,B
30 CIRCLE(64,144),40:CIRCLE(120,
96),70
40 *PAINT84,164,170,170:*PAINT12
0,60,116,248:*PAINT114,150,170,8
5:*PAINT60,104,170,85
50 *GET0,96,127,191,C
60 *PUT128,0,255,95,C,PSET
500 GOTO500
```

Editor's Note: Listings 2 and 4 use the *GET and *PUT routines generated for Disk BASIC 1.0. For any other system configuration, including cassette, you will need to run Listing 1 and/or Listing 3 to generate the proper routine for your specific system.

```
70 ........32
130 .......42
200 .......90
END ......46
```

Listing 1: GETPUT1

```
1 REM *** STAR GETPUT ***
      BY H. ALLEN CURTIS
      COPYRIGHT (C) 1985
2 REMPOKE334,158:POKE335,27:POKE
336,110:POKE337,26:POKE401,126:P
OKE402,1:POKE403,78
10 FORI=0TO288:READD$:D=VAL("&H"
+D$):C=C+D:NEXT:CLS
20 IFC<>33110THENPRINT"DATA ERRO
R":STOP
30 PRINT@162,"IF YOU HAVE NOT AL
READY SAVED   STAR GETPUT, DO SO
 NOW.
40 PRINT:PRINT"  IF YOU HAVE SAV
ED STAR GETPUT,  TYPE CONT AND P
RESS ENTER."
50 STOP
60 X=256*PEEK(27)+PEEK(28)+289:A
=INT(X/256):B=X-256*A
70 POKE474,A:POKE475,B:POKE27,PE
EK(474):POKE28,PEEK(475):CLEAR
80 X=256*PEEK(27)+PEEK(28):M=X-2
89:FORI=M TOM+288:READD$:D=VAL("
&H"+D$):POKEI,D:NEXT
90 FORJ=0TO2:POKEM+4+J,PEEK(401+
J):NEXT:DEL10-
100 DATA 81,AD,27,3,7E,C2,4D,9D,
9F,81,C4,27,4,81,C5,26,F3,34,2
110 DATA 86,4,97,7C,9D,9F,BD,B7,
3D,34,10,BD,B2,6D,A,7C,26,F4,97
120 DATA 7C,9D,9F,E6,67,54,54,54
,E7,67,EC,62,54,54,54,E0,67,2B
130 DATA 3D,5C,DD,41,CC,20,20,D0
,42,D7,50,E6,65,3D,E3,66,D3,BA
140 DATA 1F,2,E6,61,E1,65,25,24,
C1,BF,22,20,E0,65,5C,D7,43,96,42
150 DATA 3D,DD,44,9E,27,30,1,A6,
80,91,7C,27,6C,84,C0,81,40,26,B
160 DATA EC,81,30,8B,20,EE,32,69
,7E,B4,4A,A6,68,81,C4,26,F5,10
170 DATA DF,7D,DC,21,93,7D,DD,7D
,DC,27,93,44,83,0,3,DD,27,DD,23
180 DATA DC,21,93,44,83,0,3,DD,2
1,93,7D,1F,3,9E,7D,DD,7D,35,4,E7
190 DATA C0,30,1F,8C,0,0,26,F5,1
0,DE,7D,DE,27,33,41,96,7C,A7,C0
200 DATA 9E,44,AF,C1,D6,42,A6,A0
,A7,C0,30,1F,5A,26,F7,8C,0,0,27
210 DATA 48,96,50,31,A6,20,EA,1F
,13,A6,68,81,C4,26,A,AE,C1,9C,44
,25,92,9E,44,20,D8
220 DATA 9E,44,33,42,9D,9F,81,B0
,27,7,81,B1,27,6,86,A6,8C,86,A4
230 DATA 8C,86,AA,A7,8C,4,D6,42,
A6,A4,A6,C0,A7,A0,5A,26,F7,A,43
240 DATA 27,6,96,50,31,A6,20,EB,
9D,9F,32,6B,39,16,FE,E2,0,0,0
```

Listing 2: GETPUT2

```
1 REM *** STAR GETPUT ***
      BY H. ALLEN CURTIS
      COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
10 PMODE4,1:PCLS1:COLOR0,1:SCREE
N1,1
20 LINE(0,96)-(127,191),PSET,B
30 CIRCLE(64,144),40:CIRCLE(128,
96),70
40 POKE178,1:PAINT(64,144),,0:PO
KE178,5:PAINT(120,90),,0:POKE178
,139:PAINT(120,100),,0
50 *GET0,96,127,191,C
60 *PUT128,0,255,95,C,PSET
500 GOTO500
```

```
70 .......116
130 .......41
200 .......89
260 .......44
350 ......169
410 ........4
END .....114
```

Listing 3: GETPUT3

```
1 REM *** STAR GETPUTPAINT ***
        BY H. ALLEN CURTIS
        COPYRIGHT (C) 1985
2 REMPOKE334,158:POKE335,27:POKE
336,110:POKE337,26:POKE401,126:P
OKE402,1:POKE403,78
10 FORI=0TO698:READD$:D=VAL("&H"
+D$):C=C+D:NEXT:CLS
```

allow sequential loading with a single `CLOADM` command. To learn about *Link*, see my article, "Link," which appeared in the January 1985 issue [Page 58].

In using *Link*, you need to know the lowest address of the *GET storage area as well as the highest RAM address. The addresses must be expressed in hexadecimal. The lowest address serves as both the entry and first address in *Link*'s address scheme. The addresses can be derived as follows: After running to completion your BASIC program with *GETs, type and enter: `PRINT HEX$(256*PEEK(39)+PEEK(40)+1), HEX$(256*PEEK(116)+255)`. Before applying *Link*, be sure to remove from your BASIC program the *GET statements and any commands that are no longer required for drawing and painting. Then save the shortened BASIC program.

For many applications, *Star Getput* will be ideal for generating graphics and animating them smoothly and quickly. However, there may be occasions when the shapes and sizes of display objects will depend on the program's current input data. For instance, the size and orientation of wedges in pie charts will be dependent on the data being entered during the current running of a program. Pre-stored *GET display information cannot be relied on in such cases.

To increase the speed of graphics generation in programs of the foregoing type, I developed the program, *Star Paint*, in the previously mentioned article, "Festive CoCo." *Star Paint* adds the command *PAINT to CoCo's repertoire of BASIC commands. *PAINT not only colors objects at speeds consistent with *PUT's execution rate, but also conveniently colors objects in a multitude of hues.

The programs, *Star Getput* and *Star Paint* cannot be employed together. Listing 3 was written to remedy this situation. With this program, called *Star Getputpaint*, you can make full use of all three commands, *GET, *PUT and *PAINT, in your BASIC programs.

The purpose of Listing 3 is to produce a two-line version of *Star Getputpaint*, the analogue of the *Star Getput* two-liner.

If there are any remains of the two-line version of *Star Getput* in your computer (such as stored *GET information), turn the computer off and on again before typing Listing 3. To shorten your typing chore, you may want to load Listing 1 and take advantage of the close similarity of lines 1 through 240 in listings 1 and 3.

After you have correctly typed Listing 3, save and run it. When the program has completed execution, it will be in two-line form. Without changing the rest of Line 2, delete the word `REM`. Then save the two-liner.

Adding a few lines to the two-line version of *Star Getputpaint* yields Listing 4. This program illustrates the combined use of *GET, *PUT and *PAINT. It executes much like Listing 2 but faster.

The use of *Star Getput* or *Star Getputpaint*, places a small restriction on cassette-based systems: The functions `USR8` and `USR9` must not be employed in programs containing *GET, *PUT or *PAINT.

In conclusion, *GET going, and *PUT your new graphics capabilities to work.

(You may direct questions about this program to Mr. Curtis at 172 Dennis Drive, Williamsburg, VA 23185, 804-229-7086. Please enclose an SASE when writing.) ☐

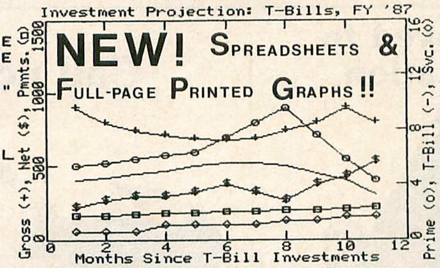
GRAFPLOT

NEW! — THE BEST JUST GOT BETTER!

GRAFPLOT DEMO:
$5.00 DISK & TAPE
REFUND W/PURCHASE
"A GREAT PACKAGE
GETS EVEN BETTER"
- RAINBOW

30 DAY
UNCONDITIONAL
MONEY-BACK
GUARANTEE!!

RAINBOW
CERTIFICATION
SEAL



- AUTOMATICALLY LOADS DATA FROM MOST POPULAR SPREADSHEETS.
- 291 GRAPHING SYMBOLS AND UNLIMITED OVERLAY OF DATA.
- AUTOMATICALLY SCALES AND LABELS ALL THREE OF THE AXES.
- CALCULATES MATH FUNCTIONS, INTEGRALS AND MOVING AVERAGES.
- FULLY AUTOMATIC, MENU DRIVEN W/ COMPLETE ERROR TRAPPING.
- FULL-PAGE SCREENPRINTS ON ANY PRINTER: SPECIFY WITH ORDER.

REQUIRES 32K EXT. BASIC: TAPE - $40.00 DISK - $45.00

NEW!! PRINTER *Picture Perfect* NEW!! UTILITY

UNIVERSAL SCREENPRINT PROGRAM

- GET "PICTURE PERFECT" FULL-PAGE PRINTOUTS EVERY TIME!
- "PERFECTLY SIMPLE" TO OPERATE - "SIMPLY PERFECT" RESULTS!
- "PERFECTLY COMPATIBLE" WITH ALL DOT MATRIX PRINTERS!
- GET "PERFECT CONTROL" OF: HEIGHT, WIDTH, POSITION, BAUD RATE, DOT DENSITY, NEGATIVE IMAGES, ETC.
- THE "PERFECT SOLUTION" TO YOUR GRAPHICS PRINTING NEEDS!
- COMPATIBLE WITH GRAPHICOM AND COCO MAX PICTURES!

◆ ONLY $25.00 ON DISK OR TAPE ◆

BUY BOTH PROGRAMS & SAVE $10.00

CALL NOW FOR FREE INFORMATION (415) 547-7557, OR WRITE:

HAWKES RESEARCH SERVICES: 859 STANFORD AVE, OAKLAND, CA 94608
YOUR PERSONAL CHECK IS WELCOME! SHIPMENT WITHIN 48 HOURS!
ADD $3.00 SHIPPING ON ALL ORDERS. CA. RESIDENTS ADD SALES TAX

The Handicappers!

For the Color Computer

From Federal Hill Software

Use your **Color Computer** to improve your performance at the track! Separate programs for **Thoroughbreds, Harness horses** and **Greyhounds** rank the horses or dogs in each race. Handicap a race in minutes, even if you've never handicapped before!

All the data you need is readily available in the thoroughbred *Racing Form*, harness or dog track program. We even provide diagrams showing you where to find the information you need! Data entry is quick and easy. Our manual shows you how to bet, when to bet and when to sit out—one of the real secrets of good handicapping.

Throughbred, Harness or **Greyhound Handicapper,** $39.95 each on tape or disk. Any two, just $59.95, all three only $79.95. Tape reqires 16K memory, Disk 32K. Will run on CoCo-3. You can buy a more expensive handicapper, but you can't buy a better one!

MasterCard

Federal Hill Software
8134 Scotts Level Rd.
Baltimore MD 21208
Orders 800-628-2828 Ext. 850
Information 301-521-4886

VISA

A final example will lead into a discussion of the means of turning *GET's memory retention to advantage: Delete lines 30, 40 and 80. Change the *GET in Line 50 to *PUT and then append a comma and `PSET` to the end of that changed statement. Running the program shows that the same designs are displayed as previously, even without the commands initially used to draw and paint them. Moreover, the designs are generated faster now.

What this all implies is that if the *GET information stored in high RAM can be loaded along with the BASIC program, neither *GETs nor the commands used to generate the stored display information need to be included in the BASIC program. The elimination of all these commands will make the BASIC program both shorter and faster. Furthermore, *Star Getput* will not destroy any string information because it will no longer need to assign *GET storage areas.

With disk systems it is a simple matter to load the *GET information with the BASIC program. It can be accomplished by the following steps:

- Run the BASIC program with the *GETs present to make sure all *GET storage areas are assigned and the needed information stored.
- Remove the *GET statements as well as all those commands which are now unnecessary for drawing and painting.
- Save the *GET storage information by typing and entering: `SAVEM"*STORE",256*PEEK(39)+PEEK(40)+1,256*PEEK(116)+255,0`.

  The address `256*PEEK(39)+PEEK(40)+1` is the lowest address in the *GET storage area. The address `256*PEEK(116)+255` is the highest RAM address.
- Now, determine precisely what the lowest *GET storage address is by typing and entering: `PRINT256*PEEK(39)+PEEK(40)+1`
- Add to the BASIC program `3 IFPEEK(39)=PEEK(116) AND PEEK(40)>252THENCLEAR100,1a:LOADM"*STORE"` where 1a has been used to represent the address determined in Step 4. Therefore, when typing Line 3, insert the address determined in Step 4 in place of the letters 1a. In the case of our example program, the inserted address should be 11427 or 27811 depending on whether you have a 16K or 32K byte RAM.
- Save the BASIC program with the newly added line.

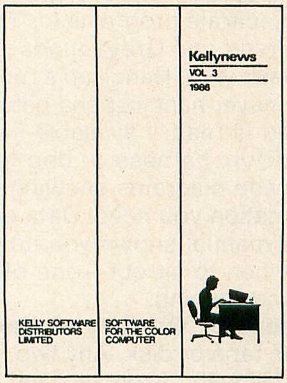
If you try this six-step procedure on the example program, turn your computer off and on following the last step. This removes the *GET information from high RAM. Then type and enter `RUN"EXAMPLE"` where it is assumed that `EXAMPLE` is the filename you specified for the example program. The `RUN` command causes the program to be loaded; the program in turn loads the *GET storage area, and then executes. If the program is stopped and rerun, it will not go through the now unnecessary process of loading the *GET display information.

With cassette-based systems it is less straightforward to load *GET information along with the BASIC program. It can be readily accomplished with the aid of a machine language program such as *Link* which combines program files — BASIC and data — on tape to

Canadians!

We are Canada's largest distributor of Color Computer products.

Send for your free copy of our 1986 Catalog

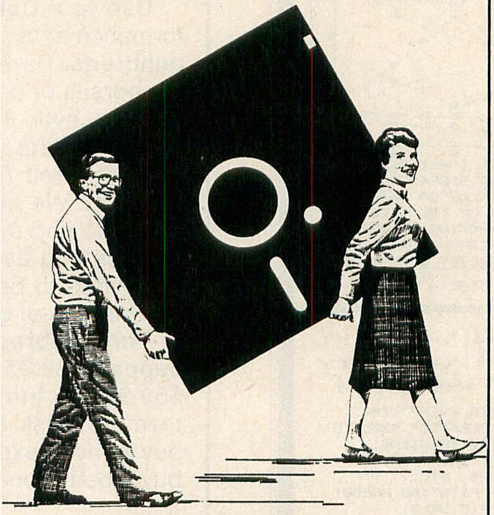

Kellynews
VOL 3
1986
KELLY SOFTWARE DISTRIBUTORS LIMITED
SOFTWARE FOR THE COLOR COMPUTER

Kellynews-3 is now available and contains news, hints, programs and articles from the crew of Kelly Software.

Please note our new phone number.

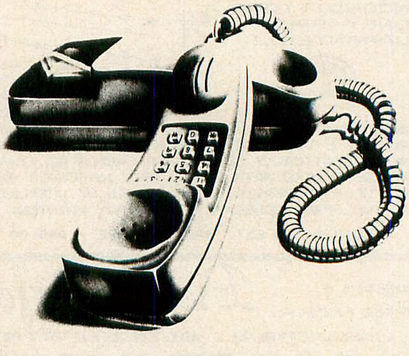
Phone: (403) 236-2161

We have moved to our new location.



Kelly Software Distributors Ltd.
P.O. Box 608,
Station 'T' Calgary
Alberta T5H 2H2

Call now . . .



(403) 236-2161

Call our orderline for quick delivery.

We accept phone orders on your VISA or Master Card. No C.O.D.

comprising the *GET and *PUT machine language routines. Lines 10 and 20 provide a check on the accuracy of your typing of the DATA values. Lines 30 through 50 inform you when to save *Star Getput*. Lines 60 through 80 store the machine language routines. Line 90 makes sure the routines are compatible with your system. Special typing care should be taken with lines 2, 60, 70, 80 and 90; errors in lines with POKEs can cause program self-destruction.

After you have correctly typed and saved *Star Getput*, run it. The program will stop at Line 50. To resume execution, type CONT and press ENTER. When *Star Getput* has completed execution, it consists of only two lines — the REM statements of lines 1 and 2. Line 90 caused the deletion of all but those two lines. Hidden from listing view in the greatly shortened *Star Getput* are its *GET and *PUT routines, which are safely stored immediately after Line 2. Adding your own lines of programming to *Star Getput* will not overwrite the machine language routines, but merely move them to a position immediately following the last line of BASIC programming.

To activate the machine language routines, you must delete the full word REM and nothing else from Line 2. After making the deletion, save the two-line version of *Star Getput*. It will necessarily be the basis of any program you write containing *GETs and *PUTs. The two-line version of *Star Getput* must always be used with the same system configuration as the one on which it was generated.

If you used *Rainbow Check PLUS* as an aid in the accurate typing of *Star Getput*, turn off your computer now. This will erase *Rainbow Check PLUS* from your computer's high RAM which will be needed shortly. Then turn your CoCo on again and load the two-line version of *Star Getput*.

Adding a few lines of BASIC programming to the two-line *Star Getput* yields Listing 2. This program and edited versions thereof will be used to illustrate the workings of *GET and *PUT.

Run Listing 2. Lines 10 through 40 serve to draw and paint the design in the lower-left quarter of the display. The *GET statement of Line 50 stores the design. The *PUT of Line 60 retrieves the design and rapidly places it in the upper-right quarter of the display. The rapidity of *PUT execution accentuates the slowness of BASIC's PAINT command. For a much faster method of painting consistent with *PUT's speed, see my article, "Festive CoCo" [July 1986, Page 46].

To compare the speed of PUT with that of *PUT, stop the program by pressing the BREAK key and add the following lines to the program:

```
45 GOTO400
400 DIMA(308):GET(0,96)-(12
  7,191),A,G
410 PUT(128,0)-(255,95),A,P
  SET
```

Run the changed program and notice how slowly the design is formed on the upper-right quarter of the display.

Delete the entire GET statement from Line 400 and rerun the program. This time PUT forms a black rectangle in the upper quarter of the display. Without a previous GET, the 'A' array contains all zeros corresponding to black pixel codes. The program did not remember the design stored in the previous run of the program.

Surprisingly, once display information has been stored by *GET, *Star Getput* can retain this information on subsequent runs with *GET deleted. To verify this, delete Line 50 containing *GET. Also, delete lines 45, 400 and 410 to remove the remains of the GET/PUT part of the program. Then run the program to see that it accomplishes the same design transfer as before.

Next, edit Line 60 by replacing the *PUT action, PSET, with AND. Running the program again shows that AND works just as fast as PSET. If you are familiar with how AND functions with PUT, you will immediately realize that it works the same way with *PUT but much faster. Replacing AND with OR in Line 60 and running the program another time reveals that OR executes as fast as PSET or AND and otherwise functions as it does with PUT.

It is possible to *PUT a portion of the display information stored by *GET. To illustrate this, edit Line 60 by changing the y1 value from zero to 48; also change OR to AND. Then run the program. This demonstrates that when the difference between y2 and y1 in *PUT is less than a similar y-ordinate difference in *GET, *PUT will write a proportional part of the stored information on the screen. However, making the difference between x2 and x1 less in *PUT than in *GET results in a scrambling of the display information. This can be verified by changing 128 to 228 in Line 60 and running the program.

Thus far, we have only discussed a single *GET, *PUT combination. A program may have several such combinations. To show this, make the following program changes: Restore x1 and x2 in *PUT to their original values by changing 228 to 128 and 48 to zero in Line 60. Delete Line 20. Delete the first CIRCLE command in Line 30. Delete from Line 40 all but the final POKE and PAINT. Insert Line 50 as follows:

```
50 *GET16,26,199,166,Z:*PUT56,
  50,239,190,Z,AND
```

then run the program.

The next example exhibits a peculiarity of the *GET command. Add the following three lines to the program and run it:

```
70 S$="TEST":T$="THIS IS A "+
  S$
80 *GET160,80,223,100,Q
90 FORJ=1TO2000:NEXT:SCREEN0,
  1:CLS:PRINTT$
```

After the graphics display is complete, there will be a slight pause and gibberish will be printed on the text screen. However, running the program again produces the expected text screen message, THIS IS A TEST.

There is an explanation for this curious phenomenon. When *Star Getput* assigns a high RAM area to each *GET command, it overwrites whatever is in the memory area where strings are stored. *Star Getput* assigns another area for strings but does not try to recover the lost string information. However, in rerunning the program, T$ was stored in the new string storage area which was left untouched by *Star Getput* because it had no new *GET areas to assign.

The fact that the assignment of *GET memory areas will destroy string information would appear to be a serious defect. However, it is easily overcome. Merely write a line or two of dummy *GETs early in your program before forming any strings. The *GET areas will be assigned early. Later, when the corresponding real *GETs are executed, no new *GET memory areas will be assigned and there will be no string information loss.

Remember, in a earlier example it was shown that the program would run without *GETs after their display information had been stored. This *GET capability can be turned to advantage to eliminate the string loss possibility, as well as providing memory and time savings.

It's here!

RAINBOW ON DISK!

ANOTHER GREAT SERVICE FROM THE LITTLE ELVES AT THE END OF THE RAINBOW

Remember the story of the cobbler and the elves, when the little people crept into the old man's shop and did all his chores while he slept? Well, there is a monthly chore we can now eliminate for you — transferring RAINBOW ON TAPE to disk!

Now, in addition to RAINBOW ON TAPE, we're offering RAINBOW ON DISK, the perfect companion to RAINBOW magazine for all our readers with disk drives. No more typing. No more transfers. We take care of all the work for you.

OS-9 programs

Thanks to the elfin magic going into RAINBOW ON DISK, part of one side of the disk is formatted for the OS-9 operating system. That means that you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. And, with the introduction of the new CoCo 3, OS-9 programs will become more and more prevalent.

More than two dozen programs

If you're a RAINBOW reader and you have a disk drive, you won't want to go another day without RAINBOW ON DISK. For only $99, 12 full issues of RAINBOW ON DISK will follow the RAINBOW to your door. That's only $8.25 for each disk.

To start your subscription, call our toll-free number or use the handy order card between pages 34 and 35. When your copy of the RAINBOW arrives next month, you can start enjoying the programs without any extra effort. The little people at the end of the RAINBOW will already have taken care of all the work.

SUBSCRIBE NOW AND SAVE AN EXTRA $9!

That's right, you can subscribe to RAINBOW ON DISK between now and January 1, 1987, for only $90* — $9 off the regular subscription price of $99. Order now and receive 12 issues for only $7.50 each!

* Don't miss out. During this special introductory offer, good until January 1, 1987, subscriptions to RAINBOW ON DISK are only $90 a year in the United States (regularly $99). Canadian rate U.S. $100 (regularly $115). All other countries U.S. $115 (regularly $130). RAINBOW ON DISK single copy rate is: $12 within the U.S.; Canadian rate U.S. $14; all other countries U.S. $16. Kentucky residents add 5% sales tax. All subscriptions begin with the current issue unless otherwise specified. Please allow 6 to 8 weeks for first copy. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

RAINBOW ON DISK and RAINBOW ON TAPE are not stand-alone products, but are intended as adjuncts and complements to the magazine. Even if you purchase RAINBOW ON DISK or RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions. For information on RAINBOW ON TAPE, see Page 160.

To order by phone (credit card orders only), call 800-847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call 502-228-4492.

GRAPHICS UTILITIES

16K
ECB

Vastly increase GET and PUT speeds

PUT Speedy GETzales to Work

By H. Allen Curtis

It is pointed out in Radio Shack's manual, *Going Ahead With Extended Color BASIC*, that in simulating motion, the GET and PUT statements can move objects faster than any other combination of ECB commands. Unfortunately, the GET/PUT movement of relatively large objects is far from being fast enough.

The goal of this article is to significantly increase the CoCo's PUT speed to permit fast and smooth GET/PUT movement of large objects. I have added two commands to CoCo's BASIC vocabulary. The two commands are new varieties of GET and PUT and will be referred to as *GET and *PUT, respectively. *PUT executes twenty times faster than PUT. This allows a BASIC programmer to generate graphics displays (stationary or animated) at machine language speeds.

The format of *GET is much like that of GET, but streamlined. Gone are the parentheses, minus sign and full graphics indicator, 'G'. The format is as follows: *GETx1,y1,x2,y2,d, where x1 and y1 form the x1,y1 coordinate of the upper-left corner of a rectangular area on the display; x2 and y2 form the x2,y2 coordinate of the lower-right corner of the same rectangular area and 'd' is a letter A to Z denoting the destination memory area at which a copy of the rectangular area is stored.

*GET does *not* store the rectangular display information in array form. For maximum speed, it stores the information directly in high RAM. *GET automatically reserves the required amount of protected high RAM. The destination letter is not a variable but merely a label identifying the area in which the display information is stored.

For increased speed, *GET and *PUT were designed to work in PMODE4 only. Limiting *GET and *PUT to PMODE4 is no real disadvantage because of the many techniques that have been developed to paint in a multitude of colors in PMODE4.

In PMODE4 there are 256 picture elements (pixels) in a display line. Each line is composed of 32 bytes containing eight pixels each. For increased speed, the whole byte in which the 'xi' (i=1,2) point is contained is transferred from display memory to RAM. For instance, *GET28,5,154,25,A would store in 21 partial lines (five through 25), each consisting of 16 bytes containing points 24 through 159.

The format of *PUT is as follows: *PUTx1,y1,x2,y2,s,a, where x1 and y1 form the x1,y1 coordinate of the upper-left corner of a rectangular area of the display; x2 and y2 form the x2,y2 coordinate of the lower-right corner of the same rectangular area; 's' is a letter A to Z denoting the source memory area containing the data to be displayed and 'a' is one of three possible actions — PSET, AND, OR.

The three actions are defined as follows: PSET, set each display point in the source memory area; AND, form the logical AND of each byte in the rectangular display area with each corresponding byte of the source memory area and write it on the display; and OR, form the logical OR of each byte in the rectangular display area with each corresponding byte of the source memory area and write it on the display.

The three actions are not optional. One of the three must be specified for each *PUT given. *PUT does not support PRESET and NOT actions in the interest of increased speed. Consistent with *GET, no partial bytes of *PUT are written on the display from the source memory. Every whole byte containing an x1 or x2 point is written on the display. The whole byte requirement is an important factor in the extremely fast *PUT execution rate.

Your computer's ECB ROM contains machine language routines for the execution of the statements GET and PUT. To add *GET and *PUT to CoCo's BASIC command repertoire, analogous machine language routines *must* be generated and stored in RAM. Listing 1, called *Star Getput*, does the required machine language routine generation and storage.

In the listing, the DATA values of lines 100 through 240 contain the 289 bytes

---

H. Allen Curtis lives in Williamsburg, Virginia. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.

PRICKLY-PEAR SOFTWARE

QUALITY PROGRAMS FOR YOUR COCO & TDP-100

PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

HALL OF THE KING (Rainbow Review 6/86)

This program combines all the things you look for in a great two disk graphics adventure program. The Hi-Res graphics are superbly done. The text portion of the screen and the graphics change quickly as you move through the **HALL OF THE KING.** You can move freely from one portion of the adventure to another. Call up your inventory at any time. You can even save or load a game at ANY time. **HALL OF THE KING** will challenge even the most seasoned adventurer.

HALL OF THE KING requires 64K EB and one disk drive. This exciting two disk adventure comes packaged in a vinyl case. **$39.95.**

HALL OF THE KING II — THE INNER CHAMBER

Continue your quest for the Earthstone in The Inner Chambers of the **HALL OF THE KING.** Outstanding graphics help show the way to success in your search to help restore the legendary power of the Earthstone to the dwarven race. The deeper you travel into the inner chambers, the more difficult your progress becomes. **HALL OF THE KING II** has all the fine features of the first adventure. It is designed to follow the original **HALL OF THE KING** but may be played as a stand-alone adventure. The adventure fills two disks and comes packaged in a handsome vinyl folder. It requires one disk drive and 64K. **$39.95**

WARP FACTOR X (Rainbow Review 2/86)

If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. (See review in Feb. 85 issue of Rainbow.) It requires 32K one disk drive and comes packaged in a vinyl library case. **$34.95**

DARKMOOR HOLD (Rainbow Review 8/86)

You and your comrades will explore the levels of Darkmoor Hold in an effort to gain great riches and defeat the dark wizard. The Wizard will soon realize the threat you pose and the many monsters you meet and battle will become stonger and more powerful as you move through the 10 levels of Darkmoor. A keen eye will help you find weapons and armor to aid your battle along with treasures for you to keep. Your party consists of a Dwarf, an Elf, and you, the Human, each with their own special attributes. The weapons, armor and treasure are placed randomly in each level to provide a new challenge each time you play. You may also save the game you are playing since defeating the evil Wizard is not an easy task. It has great graphics and an impressive text screen to give you more fun than a barrel of elves. Requires 64KEB and 1 disk drive. **$29.95**

POLICY ON PROTECTION

We believe our customers are honest — all of our software can be backed up using standard backup procedures.

Your Personal check is welcome - no delay. Include $1.50 shipping for each order. TX residents add 5 1/8% sales tax. Orders shipped within two days.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd. 608, STNT, Calgary, Alberta T5H 2H2, (403) 236-2161

DRAGONBLADE

DRAGON BLADE
Animated Graphics Adventure

This 100% hi-res graphics adventure features many animated screens which will delight the avid adventurer. You search for the magic Blade which is the only way to rid your homeland of the fearsome dragon which has risen from a long rest to terrorize your village. Fill your screen with super graphics as you try to solve the difficult challenge the village leaders have set before you. Dragon Blade requires 64K EB and 1 disk drive. **$29.95**

UTILITIES

RTD Trio — Take advantage of this special offer. This package of three utility programs includes our new DISK TO TAPE, TAPE TO DISK (version 2.0), and ROMFREE (version 2.0). TAPE TO DISK moves BASIC, ML and DATA files from tape to disk automatically — one program or an entire tape. It even fixes those programs that load at hex 600 so they work on a disk system. ROMFREE moves ROM packs to tape or disk easily, and fixes them so you just load and EXEC. ROMFREE now accomodates the larger 16K ROM packs. You won't believe how easy it is to protect your software library! These programs are shipped on tape. Requires 16K. **$49.95** (**$24.95** each if purchased separately)

Prickly Pear Maillist — Ver. 2.0 — You won't find a mailing list program anywhere that will out-perform this one. Req. 32K and one disk drive. Only **$29.95**

STATISTICS

Lizpac — Absolutely the most complete statistics package we have seen for ANY computer anywhere. Lizpack is 850,000 Bytes of programming filing 7 disks with an eighth disk containing data files to be used in the examples. The 200 page manual completely explains all that Lizpac has to offer. It is user friendly. Send for more information. Req. 32K disk only. **$195.00**

Send for our free catalog

Call (915) 584-7784 or

Send Order To: **PRICKLY-PEAR SOFTWARE**
213 La Mirada
El Paso, Texas 79932

I can't find the `POKE25,6:NEW` *equivalent for a Disk* BASIC *system. Can you help?*

Kevin Armalay
Pendel, PA

℞ Kevin, The equivalent is `POKE 25,14:POKE&HE00,0:NEW`

Is there a good Hi-Res screen dump for a DMP-100 printer?

Harry H. Hull
Martinsville, IN

℞ Radio Shack markets *BW-Dump* as part of their Hi-Res screen dump utilities package which is compatible with your printer.

How can I get colors in `PMODE4`*?*

Ben Ariel
Natanya, Israel

℞ You get the extra colors using artifacting, Ben. For example, if you draw two single pixel wide vertical lines on a `PMODE4` screen, the double pixel wide line will appear either red or blue.

How do I speed up the clock on my CoCo as turbo enhancements do the IBM PCs? Has anyone heard anything about the new CoCo that was discussed at the Microware convention last year?

Christopher Oxenreider
Montevideo, MN

℞ The new CoCo 3 uses a 68B09 with a 2-MHz clock for twice the speed of current CoCo 2s. Christopher, see the September 1986 RAINBOW for first impressions of the CoCo 3.

I would like to know the real differences between a cassette and a disk drive.

Pete Hagemeyer
Bethlehem, PA

℞ Pete, the advantages of a disk over tape include speed of data transfer, reliability of data transfer and direct access capability.

I would like to dump graphics screens from Radio Shack's Micro Illustrator *which runs under OS-9. Would Radio Shack's OS-9 High Resolution Screen Dump program work with it?*

Charles Ward
Louisville, KY

℞ It will work if you use one of Radio Shack's 9-pin dot-matrix printers.

I have been having some problems trying to print text screens from my programs on my printer. I have included a sample program that is typical of the programs I am trying to print. They all work great on the computer screen, but I can't get my printer to reproduce them. Can you help?

Helga Craig
Uniondale, NY

℞ Insert `GOSUB 1000` in your program where you want it to dump the screen, Helga.

```
1000 FOR I=1024 TO 1535 STEP 32
1010 A$=""
1020 FOR J=I TO I+31
1030 A$=A$+CHR$(PEEK(I+J));
1040 NEXT J
1050 PRINT #-2, A$
1060 NEXT I
1070 RETURN
```

How can I change the print width for Disk Spectaculator *(RS 26-3256)?*

David Bacus
Detroit, MI

℞ David, to patch your *Spectaculator* program, type the following:

```
PCLEAR8 ENTER.
LOADM "SPEC/BIN" ENTER.
POKE &H244E, <new printer
width +1> ENTER
SAVEM "SPEC/BIN", &H1400,
&H35FF, &H1400 ENTER
```

Note: for the ROMpak version, the print width is at Address $D0AF.

How can I fix the `RND` *function so that it generates a different sequence of random numbers immediately after I power up my CoCo?*

Dan Frances
Kent, WA

℞ Insert `X=RND(-TIMER)` at the beginning of your program to seed the CoCo's random number generator, Dan.

I saw several dump programs in the May 1986 issue of RAINBOW *which I tried on my CoCo. None of the programs worked on my printer, a DMP-110. Please send me a program for my printer or tell me where I can find a useful screen dump program for my machine.*

Danny McVey
Pendleton, IN

℞ Well Danny, *Versadump* is a user-configurable screen print utility for most 9-pin dot-matrix printers. It appeared in the March 1985 issue of *HOT CoCo* in an article entitled "Printer Answers."

I have replaced my ROM BASIC *1.0 CoCo with a CoCo that uses* BASIC *1.1. The only problem I have with it is that my word processor, Telewriter-64, will not work with the* BASIC *1.1. Is there any way I can make my word processor compatible with the updated* BASIC*?*

Charles Ross
Allentown, PA

℞ Charles, a program called *Telepatch II*, from Spectrum Projects, allows you to use the 1.1 ROM. It also provides several additional features to enhance *Telewriter-64*. It sells for $29.95.

How do I disable the I/O Error when loading a BASIC *program so that I can at least salvage the portion of the program up to the error?*

Charles Gibson
Edwardsville, IL

℞ "Doctor ASCII" contained a program that allowed you to load a BASIC program up to the point where the I/O Error was encountered. For more information, Charles, look in the November 1983 *HOT CoCo*.

VIP Library *refers to the LCA-47 lowercase adapter and its attributes. Do you have any further information on this subject?*

Joseph Johnston
Swanton, VT

℞ The article "80 Applications," in the November 1982 *80 Microcomputing* [Page 78] contains instructions for building your own LCA-47 lowercase adapter for the CoCo including schematic, Joseph.

I want to play games on my CoCo with a friend over the phone. Do you know of anything available that will allow me to do this?

Denis Bowers
Ontario, Canada

℞ Denis, *Bit 232* published in "Doctor ASCII" in *HOT CoCo* February 1986, allows two CoCos to send and receive information via the RS-232 port using BASIC. Also, see the *McCheckers* game on Page 114 of this issue.

For a quicker response, your questions may also be posted in the Forum section of RAINBOW's CoCo SIG on Delphi. In Forum, type `ADD` **and address your questions to the username DOCTOR ASCII. You may also send questions to DOCTORASCII via Delphi Mail.**

available that will allow me to do this?

A. Obner
Hendersonville, NC

℞ Only high level language source code such as C, PASCAL, BASIC, etc., saved in ASCII can be transferred to CoCo ASCII files. They may then need customization due to hardware or I/O differences. The program that allows you to do this is *CoCo Util II.* It sells for $39.95. Contact Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, (714) 7768-1551.

Does anyone offer FORTH for the CoCo? How about FORTH on a ROM chip to replace BASIC?

Charles Beckers Jr.
Middletown, RI

℞ There are no FORTH ROM chips available for the CoCo that I know of, Charles. Frank Hogg Laboratory offers eFORTH for FLEX or Disk BASIC for $79.95. Contact them at 77 James St., Syracuse, NY 13203, (315) 474-7856.

I have a Radio Shack Line Printer VIII which I use in my business. The printer works great except, due to my heavy use, the pins wear out and break. Radio Shack only offers the entire print head unit which costs $99, but I only need the pins. Do you know where I can obtain these pins separately?

Marvin D. Petersen
Sepulveda, CA

℞ The print head is sold by Radio Shack only as a unit. TEK's part number is HE82C117101 for the head. Marvin, I suggest you contact NEC and/or C.Itoh, which are the other companies that import TEK printers under their labels.

Where can I get a ribbon for my printer without having to buy the entire cassette the ribbon fits into?

Marlene
Fresno, CA

℞ BCCOMPCO, 800 South 17, Box 246, Somersville, MO 65571, (417) 932-4196 is a supplier of ribbons without the cartridges for various popular computer printers, Marlene. Another solution is to re-ink your ribbons with MacInker from Computer Friends, 6415 S.W. Canyon Ct., Portland, OR 97221, (503) 297-2321.

How do authors split the screen so that the upper half is graphics and the lower half text? I'm interested in writing my own Adventure and would find this technique very useful.

Jason Johnston
Lillooet, British Columbia

℞ The text is generated with high resolution graphics using a program such as Computerware's *64K Screen Expander* software, Jason.

How can I find the start address, length and end address of a machine language/binary file written on tape? I want to read these programs and store them on disk with the proper information so they can be loaded and run from disk.

Paul L. Bishop
Aurora, Ontario

℞ Load the program into memory, Paul. The start address is `PRINT PEEK(487)*256+PEEK(488)`. The end address is `PRINT PEEK (126)*256 + PEEK(127) -1`. The execution address is `PRINT PEEK(157) * 256 + PEEK(158)`. To obtain the length, simply subtract the end address from the start address and add 1.

Is there a disk-to-tape or tape-to-disk copier that I can use to transfer my files? How can I find out what type of board I have?

Jason Munson
Tucson, AZ

℞ See Roger Schrag's "The Limosine Utility: A Tape to Disk Transfer Vehicle" (RAINBOW, January 1984) for the transfer utility you want. Look at the lower right-hand corner of the printed circuit board for the serial number of your machine, Jason. CoCo board serial numbers ended with the letters 'D', 'E' and '285' or 'NC'. The former are known as 'D' and 'E' boards, and the latter as 'F' boards.

I need a head alignment kit. Do you know where I can obtain one for my CoCo? I asked a salesman at Radio Shack and he had no idea.

Ron Clifton,
Charleston, SC

℞ J&M Systems, 15100-A Central SE Albuquerque, NM 87123, (505) 292-4182, sells *Memory Minder*, a disk drive diagnostics program and a special precision alignment disk with versions for single- and double-sided drives. [See review in RAINBOW September 1986, Page 144.]

Does anyone offer a program similar to Print-Shop? *The program is used to make signs or posters on regular-size paper.*

David Jones
Frostburg, MD

℞ *CoCo MAX II* from Colorware gives you the capability to put text and graphics together on the CoCo's screen much like the acclaimed Apple McIntosh's *MacPaint*. Hopefully, David, the makers of *CoCo MAX II* will come out with a super version for the new CoCo 3.

I am looking for a COBOL compiler. Do you know of any on the market at the present time?

Robert Lett
Columbus, MS

℞ Frank Hogg Laboratory sells both OS-9 and FLEX COBOL compilers for the CoCo, Robert. *Crunch COBOL* for FLEX is $99.95 and *CIS COBOL* for OS-9 is $400.

I need a BBS program for one or two disk drives. Do you know where I can obtain one?

Paul Bolton
Shreveport, LA

℞ Paul, RAINBOW published a bulletin board program in November 1985 called *CoBBS*, by Richard Duncan. It was largely written in BASIC, thus easily customizable for your own computer applications.

I am looking for a word processor for my CoCo that would allow me to edit two files independently, but side by side. Do you know of any word processors in the works that would allow me to do this?

Paul Whiting
Madison, WI

℞ No, not for the CoCos 1 or 2, but with windows on the CoCo 3, the capability is there. You could have two *Stylograph* sessions operating in separate windows and switch back and forth between them, Paul.

I just purchased a TRS-80 Touch Pad but cannot find any software advertised to work with it.

Michael J. Fath
Wadsworth, OH

℞ It simulates a joystick, Mike, so many joystick-compatible programs will work with it.

Introducing a new Rainbow column

Rainbow to the Rescue

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

In the fall of 1985, when Radio Shack did not offer a "Super CoCo" to compete with the new Commodore and Atari offerings, the publishers of *HOT CoCo* magazine apparently assumed the CoCo was dead so they killed their magazine. In time, the people at Peterborough [CW Communications/Peterborough Inc.] evidently thought CoCo owners would switch over to the Tandy 1000.

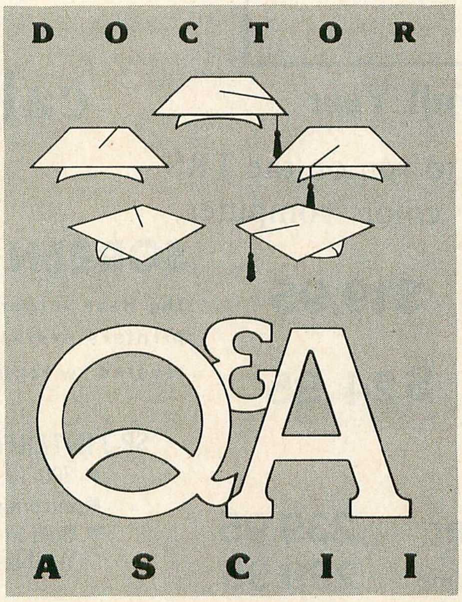
After the demise of *HOT CoCo*, my column, "Doctor ASCII," was switched to another of their magazines, *80 Micro*. But, it was clear to me from the beginning that the days of Color Computer coverage in *80 Micro* were numbered. I was given some hope when Tandy surprised everyone by releasing sales figures [first quarter, 1986] indicating that CoCo sales were still quite high; 36,000 versus 42,000 for all of the Tandy MS-DOS systems [Editor's Note: These figures do not even include Christmas sales, in which the CoCo is always a clear standout!] But, alas, additional coverage of the Color Computer in *80 Micro* did not materialize and existing coverage was relegated to the rear of the magazine.

Rather, *80 Micro* reaffirmed their support for Tandy's Z80 and MS-DOS products, so it came as no surprise to me when I received a telephone call informing me that the "HOT CoCo" section of *80 Micro* and, consequently, "Doctor ASCII" were being killed.

Wanting to preserve my long established column, I immediately called THE RAINBOW. Editor and Publisher Lonnie Falk and Managing Editor Jim Reed were both cordial and supportive. They understood my commitment to the CoCo Community and shared my enthusiasm for carrying on. They, too, wanted "Doctor ASCII" to continue.

So, thanks to THE RAINBOW, the tradition continues. [Editor's Note: With the gracious consent of Eric Maloney, editor-in-chief at *80 Micro*, the column will continue to be known as "Doctor ASCII."] And, with the introduction of the new Color Computer 3, the CoCo is stronger than ever — a great new force in the home market. I am pleased to be affiliated now with THE RAINBOW staff and with publisher Lonnie Falk, whose faith in the Color Computer has never wavered.

Richard Esposito is a project engineer for TRW's Government Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.



How is the INKEY$ statement used in programming? I'm attempting to write programs to assist me in performing research in my psychology classes.

Scott Lane
Walla Walla, WA

℞ The INKEY$ function checks momentarily to see if a key is depressed, Scott. If a program contains the statement `100 A$=INKEY$`, most likely A$ will contain an empty string after it is executed unless you are Johnny-on-the-spot pressing the key the moment your CoCo looks for it. The usual code that uses it is as follows:

```
100 A$=INKEY$: IF A$ < >"" THEN
100
```

With this code, the CoCo keeps executing the INKEY$ function until it returns a non-null character which can then be found in the variable A$.

Is there a program on tape to convert the computer screen to 80 columns instead of 32?

Todd Johnson
Rochester, MN

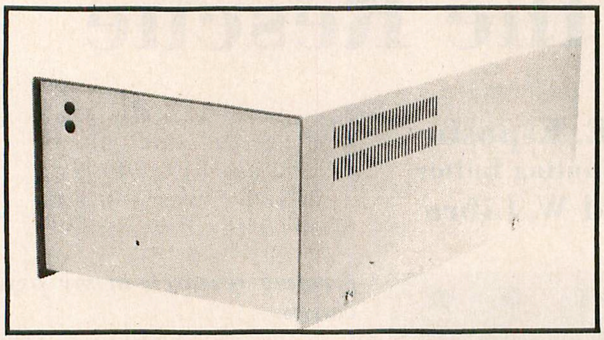
℞ PBJ's *Wordpak* plugs into Radio Shack's MultiPak interface and drives an 18-MHz or greater composite video monochrome monitor. Software drivers are available for FLEX, OS-9 and Disk BASIC. Most Radio Shack software will not run using *Wordpak* unless it is specifically designed to use it, Todd. Elite Software and Cer-Comp are the leading marketers of *Wordpak*-compatible Disk BASIC software. Most FLEX and OS-9 software using PBJ's drivers uses the full 80 columns with little or no modification.

I need to use IBM-compatible programs on my CoCo at times and was wondering if there is any software

New Hard Drives

---------- COMPLETE SYSTEM ---------- JUST PLUG IN ----------

Call For
BEST PRICE



Warranty - One Full Year

5 to 20 *Megabyte*, ready to run on the TRS 80 Model I/III/IV/4P, color computer,

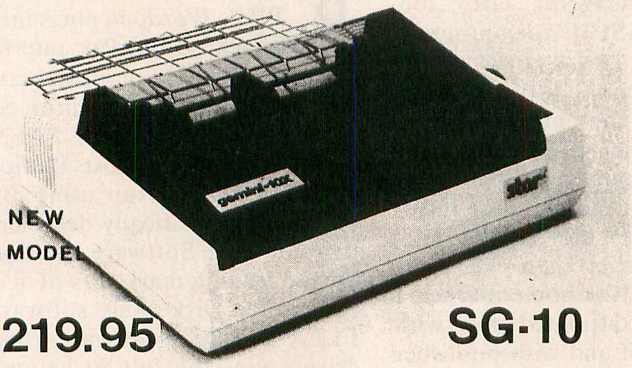
64K UPGRADES $19.95

VIDEO DRIVER $24.95
ENABLES YOUR COCO TO OPERATE WITH A VIDEO MONITOR INSTEAD OF A TELEVISION!

Panasonic 1091 Printer	239.95
1091 Printer & SP3 & Screen Dump	299.95

star PRINTERS

PRINTER CABLES AND INTERFACES AVAILABLE
Call for current pricing

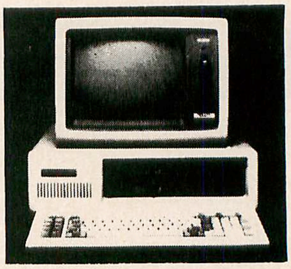


NEW MODEL

$219.95

SG-10

IBM XT COMPATIBLE



call for low price

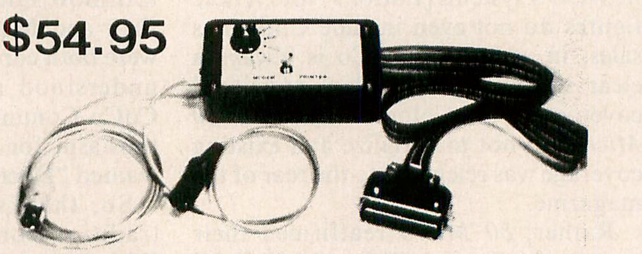
SCREEN DUMP PROGRAM

The best screen dump program for the Epson & Gemini printers ever!! Have the option of standard images reverse w/regular or double sized pictures $19^95

SP-3 INTERFACE for Color Computer

- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables

Only:
$54.95



COMPLETE SYSTEM
299^95
NEW LOW PRICE
now with screen dump
Nothing more to buy!

Dealer inquiries invited

TRUE DATA PRODUCTS
9 SOUTH MAIN ST.
UXBRIDGE, MASS.01569

CALL US TODAY!! 617-278-6555
ORDER TOLL FREE 1-800-635-0300

NEW

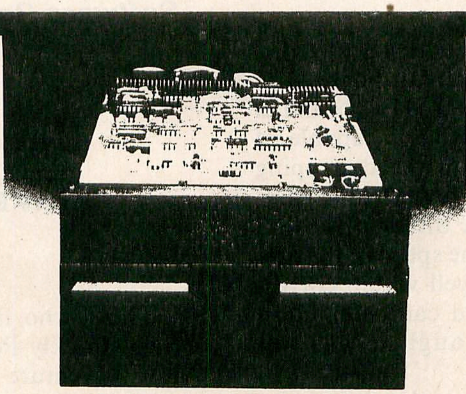
DISK DRIVES

STARTING AT

$ 89.95

WITH CASE & POWER SUPPLY

$129.95



TANDON MPI TEAC

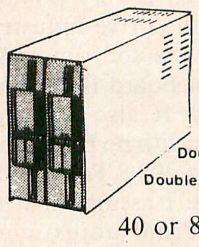
Speed 6 ms tk to tk and up

Capacity 250k unformatted

Tracks 40

Warranty **now 1 YEAR**

New Low Price!



40 or 80 Tracks

1/2 Hght. Teac/Panasonic

CALL FOR SALE PRICES

We carry only the finest quality disk drives * no seconds * no surplus

SATISFACTION GUARANTEED!!

ALL DRIVES FULLY TESTED & WARRANTEED

Complete Disk Drive with Power Supply & Case .... Teac $129.95

Two Drives in Dual Case & Power Supply .... Teac ..... ~~$279.95~~ CALL

1/2 ht double sided double density Disk Drives (Panasonic/Teac) $ **$119.95**

1/2 ht double sided double density Disk Drive with ps & case ...... ~~$199.95~~ CALL

free How to use your new drive system on audio cassette

Single ps & case $44.95 Dual 1/2 ht ps & case .... $54.95 Dual ps & case ... **Call**

Color Computer Controller (J&M) **$129.95**

DRIVE 0 FOR RADIO SHACK COLOR COMPUTER

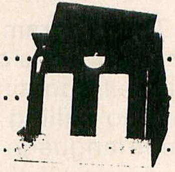
TANDON, MPI OR TEAC DRIVE (SINGLE SIDED 40 TRACKS SPEED 5 MS TRK TO TRK & UP)
POWER SUPPLY and CASE, TWO DRIVE CABLE WITH ALL GOLD CONNECTORS
J&M CONTROLLER, MANUAL and DOCUMENTATION .... ~~$249.95~~ ...... $ SALE!

BUY THE BEST FOR LESS! CALL!

DRIVE 0 FOR RADIO SHACK COLOR COMPUTER

PANASONIC 1/2 HEIGHT DOUBLE SIDED DOUBLE DENSITY DRIVE 500K unformatted
POWER SUPPLY and CASE, 2 DRIVE CABLE WITH ALL GOLD CONNECTORS
J&M CONTROLLER, MANUAL and DOCUMENTATION .... ~~$279.95~~ .... Super!! SALE!

TAKE ADDED SAVINGS ON TWO DRIVE SYSTEMS



10 Diskettes CD CONTROL DATA

DISKETTES with free library case $17.95

Unadvertised Specials .... $Call

Drives cleaned, aligned & tested $29.95

TECHNICAL STAFF ON DUTY, PLEASE CALL FOR ASSISTANCE.

CALL US TODAY!! 617-278-6555

ORDER TOLL FREE 1-800-635-0300

* DEALER INQUIRIES INVITED.

617-278-6555

TDP

TRUE DATA PRODUCTS

9 SOUTH MAIN ST
UXBRIDGE, MASS. 01569
617-278-6555

HOURS MON--SAT 9-6 (EST)

We welcome
- Visa / Master Charge VISA MasterCard
- Checks (allow 2 weeks for clearing)
- C.O.D. Add $2.00

ut when you started, and you're finished. The whole rocess doesn't take over 10 minutes.

Drive 1 Upgrade is of excellent quality, with a heavy, die-ast frame and rigidly mounted printed circuit board. The alf-height design is very popular and the TEC brand is ell-known in the drive industry. The drive is capable of ccessing 40 tracks and runs easily at 6 ms head stepping ate. The circuit board flat cable connector features gold-lated contacts. It also incorporates a direct drive DC rushless motor with no belt. I checked the speed of the new rive and it was 298.8 RPM, which is well within correct perating limits. I assume that the speed can be changed ith some internal adjustment, although it was not ocumented.

My only complaint with this upgrade is that it is noisy uring track-to-track access, but it's no worse than the adio Shack Drive 0. Setting the stepping rate at 6 ms reatly reduces the noise, as many CoCo users have already iscovered.

I believe this upgrade should be investigated by any CoCo ser interested in adding extra disk drives. It's not difficult o install (no soldering is required) and you can save $60 r more by doing it yourself.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414, $139.95 plus $3 S/H)

— Jerry Semones

About The One-Liner Contest . . .

THE RAINBOW'S One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should *be very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

Become a Hi-Res Hero With *Dragon Blade*

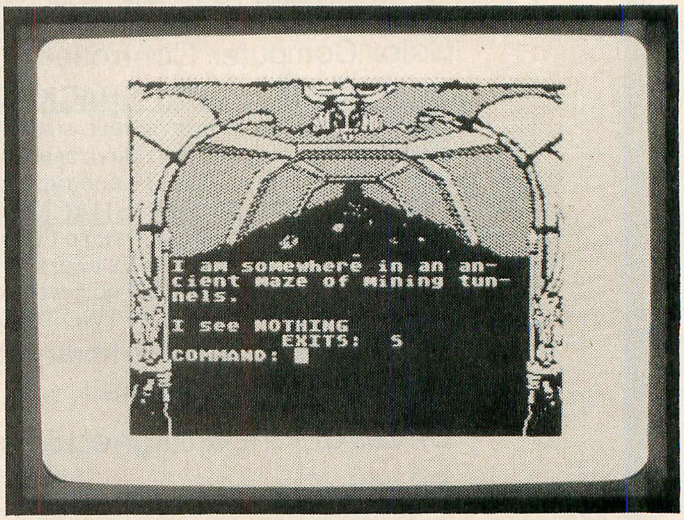
Those who like playing Adventure games are in for a treat. Prickly-Pear Software has created an animated, Hi-Res Adventure that sends you into the Middle Ages with style.

The object of the game is to find the Dragon Blade, which is the only thing that will kill the ancient dragon that has been terrorizing your small medieval village.

In its last attack, the dragon killed your father, the chief of the village. Now you must succeed him as chief, and somehow save the village from further attack.

You begin your quest in the Forest of Lore, soon discovering that the quiet countryside holds mystery and danger. As you search for the Blade, you encounter gargoyles, witches and a menacing guardian. You may fall into an abandoned mine shaft and find yourself wandering in a dark maze, or facing a monster who can turn you into stone with a single look. Despite these risks you must forge ahead, gathering the tools and knowledge that will allow you to slay the dragon and save your village.

Some Hi-Res Adventures are so slow you have to wait more than you play, but *Dragon Blade* is quick enough to keep the action rolling. The graphics are first-rate. (See Figure 1.) They are well-designed and do a good job setting the stage for a medieval quest. Several screens bring the Adventure to life with animation.



```
I am somewhere in an an-
cient maze of mining tun-
nels.

I see NOTHING
      EXITS:  S
COMMAND: █
```

Figure 1: Although the photo is shown in black and white, the actual Hi-Res game screen is in color.

Dragon Blade is definitely worth buying if you enjoy Adventure games — and it would make a great Christmas gift for your favorite CoCo nut.

(Prickly-Pear Software, 213 La Mirada, El Paso, TX 79932, 64K disk required, $29.95)

— Andy Dater

> *". . . pick an option from a pull-down menu and it instantly prints a bullet chart you can print directly on an overhead transparency."*

screen, although it can accept lines up to 256 characters long.

So far I have only heard of two drawbacks to the Color Computer 3 as far as OS-9 Level II is concerned. The first is the fact that the Tandy Sound/Speech Cartridge does not work with it because OS-9 always runs at 1.79 MHz and the Sound/Speech Cartridge can only deal with .89 MHz. The good news is you can add a switch to bypass the XOR gate in the Sound/Speech Cartridge and it will work at the higher clock speed. The other drawback is that a modification must be made to the expansion interface to allow it to run. You need to take it to a computer center to have it modified.

Larson's *SysGo* Revisited

In May of this year we published an alternate *SysGo* module for OS-9 Level I, Version 1.00 or Version 1.01. Also that month, we discussed various techniques you could use to force OS-9 to start up in a RAM disk. David Curtis, of Heath, Ohio, put the tips into action and sent us the completed product. It is listed here. Curtis also submitted a simple utility that takes the place of the Microsoft BASIC `CLS` command. Interestingly enough, we received another `CLS` program from John Bowden of the U.S. Navy's COMTHIRDFLLT N-2 in Pearl Harbor, Hawaii. Bowden's code shows how to fork a new process since it clears the screen by calling the OS-9 display command. If you have both display and `CLS` loaded in memory, this method is fast, too.

Version 2.00

Along with his program listings, Curtis sent a question. "Why bother with OS-9 Level I, Version 2.00?" he asked. "The 80-column driver won't run my *WordPak I*. The disk driver won't handle double-sided drives. The hard drive Tandy supports is out of sight price-wise. The config program is nice and permits easy creation of a custom system disk. That's about it."

I guess the answer to that question revolves around what you are going to do with your computer. If you plan on running all the new programs coming out for OS-9, you'll most likely need the latest version of the operating system. Some programs operate across a number of operating systems; many

SPECIAL DEAL ON 500 PROGRAMS!

GET 50 DISKS OR 50 CASSETTE TAPES FULL OF OVER 500 PROGRAMS. HERE IS WHAT YOU'LL RECEIVE:

- ★ Over 250 Utility/Home Application Programs including a Word Processor, DataBase, Spreadsheet, Account Manager, 2 Basic Compilers, Terminal Programs, ROM Copies, Mail List, Machine Language Tutorials, Plus Much More!
- ★ Over 200 exciting games including Warlords, Star Trek, Super Vaders, Solar Conquest, Horse Races, Football, Baseball, Frog Jump, Invader, Plus Much More! (Many machine language games)
- ★ Over 30 adventures including The College Adventure, Dungeon Master, Space Lab, Ice World, Ship Wreck, Zigma Experiment. Plus 32K Graphic Adventures.

EACH INDIVIDUAL ISSUE SOLD FOR $9.00 EACH OR $450 FOR ALL 50 ISSUES. WE SLASHED THE PRICE TO ONLY 150.00.

REG. $450 NOW $150.00

★★THIS MONTH ONLY★★

Buy this package of 500 programs and receive a free 6 month subscription. (A $35 value)

VISA

RAINBOW CERTIFICATION SEAL

THE GREATEST SOFTWARE DEAL ON EARTH JUST GOT BETTER!

THAT'S RIGHT! THIS MONTH WE'VE DROPPED OUR YEARLY SUBSCRIPTION RATE AN UNBELIEVABLE $10.00 TO ENTICE YOU INTO SUBSCRIBING WITH US. GET 12 DISKS OR TAPES A YEAR CONTAINING OVER 120 QUALITY PROGRAMS. A SUBSCRIPTION TO T & D SOFTWARE CONSISTS OF 10 READY-TO-LOAD PROGRAMS DELIVERED BY FIRST CLASS MAIL EVERY MONTH.

NO WE ARE NOT THE SAME AS THE RAINBOW ON TAPE. IN FACT, MANY SUBSCRIBERS HAVE WRITTEN IN AND SAID THAT WE ARE MUCH BETTER THAN RAINBOW ON TAPE!

PRICES

	TAPE OR DISK	THIS MONTH ONLY
1 YEAR (12 issues)	~~70.00~~	60.00
6 MO. (6 issues)	~~40.00~~	35.00
1 ISSUE	~~9.00~~	8.00

Michigan Residents Add 4%
Overseas Add $10 to Subscription Price
Personal Checks Welcome!

- ★ 16K-64K Color Computer
- ★ Over 4000 Satisfied Customers
- ★ Back Issues Available From
- ★ July '82 (Over 500 Programs)

OUR LATEST ISSUE CONTAINED

1. Computer I.O.U.
2. Disk Disassembler
3. Bak Chekers
4. Pachinko
5. Stock Charting
6. Haunted Staircase
7. Canyon Bombers
8. Dragon Adventure
9. Graphic Scroll
10. Auto Border

RAINBOW CERTIFICATION SEAL

MasterCard

T & D SUBSCRIPTION SOFTWARE, P.O. BOX 256C, HOLLAND, MI 49423 (616) 396-7577

Protect and highlight your important magazine collection with sturdy RAINBOW binders

Distinctive, Durable RAINBOW Binders

THE RAINBOW is a vital resource to be referred to again and again. Keep your copies of THE RAINBOW safe in our quality, distinctive binders that provide complete protection.

These **attractive red vinyl binders** showcase your collection and ensure your RAINBOWS are in mint condition for future use. Each binder is **richly embossed with the magazine's name in gold** on the front and spine. They make a handsome addition to any room.

Put an End to Clutter

Organize your workspace with these tasteful binders. Spend more time with your CoCo and eliminate those frustrating searches for misplaced magazines.

A set of two binders, which holds a full 12 issues of THE RAINBOW, is only $13.50 (plus $2.50 shipping and handling).

Special Discounts on Past Issues

To help you complete your collection of THE RAINBOW, we're offering a **special discount on past issues** of the magazine.

When you place an order for six or more back issues of THE RAINBOW at the same time you order binders, you are entitled to $1 off the regular back issue price. To order, please see the "Back Issue Information" page in this issue.

Know Where to Look

You may purchase the "Official And Compleat Index To THE RAINBOW" for $1 when you purchase a set of binders. This comprehensive index of RAINBOW's first three years (July 1981 through July 1984) is usually priced at $2.50.

For greater convenience, order RAINBOW Binders through the shopping area of the CoCo SIG of Delphi!

……

____ **YES**. Please send me ______ set(s) of RAINBOW binders

Take advantage of these special offers with your binder purchase:

____ Save $1 off the single issue cover price for back issues. Minimum order of 6 magazines. Please enclose a back issue order form from a recent issue indicating magazines wanted.

____ Purchase the "Official and Compleat Index to THE RAINBOW" for $1. (Regular price $2.50.)

(These offers good only with the purchase of a RAINBOW binder set)

Name ____________________
Address ____________________
City ____________ State ______ ZIP ______
☐ My check in the amount of ______ is enclosed. (In order to hold down costs, we do not bill.)
Charge to: ☐ VISA ☐ MasterCard ☐ American Express
Account Number ____________ Expiration Date ______
Signature ____________________

Mail to: **Rainbow Binders, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.**

Binders are $13.50 per two-binder set plus $2.50 shipping and handling. If your order is to be sent via U.S. mail to a post office box or foreign country, please add $2. Kentucky residents add 5% sales tax. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST
All other inquiries call (502) 228-4492.

won't. Almost all of the new Tandy software products require OS-9 Level I, Version 2.00 to operate.

Starting BASIC09

Ray Preston of Rarotonga in the Cook Islands was one of a group of recent writers wanting to know how to get BASIC09 up and running.

Here's the problem. Tandy did not put BASIC09 in the CMDS directory on the production disk. They put it in the root directory. If you have two disk drives, leave your system disk in Drive /d0 and plug the BASIC09 disk into Drive /d1, then type:

```
OS9: chx /d1
OS9: Basic09
```

If you have a single-drive system, take out the system disk and plug the BASIC09 disk in Drive /d0, then type:

```
chx /d0
basic09
```

This should put you on the air once and for all.

OS-9 Software Sourcebook

The OS-9 Software Sourcebook written by Phyllis Casel can help you find that software you're looking for. It's available from Microware Systems Corporation, 1866 N.W. 114th Street, Des Moines, IA 50322, (515) 224-1929. Give them a call.

If all goes well, by the time I write the next installment, we will be settled in here in New York City and will have had our hands on the new CoCo 3 for several weeks. Now if we can just get our hands on Level II OS-9! ☐

Listing 1: sysgo

```
                                ifp1
                                endc

000D                  c.cr      equ    $d
0000 87CD009A                   mod    eom,name,$C1,$81,start,$00C8
000D 53797347         name      fcs    /SysGo/
0012 06                         fcb    6
0013 2F5230           newdir    fcc    "/R0"
0016 0D                         fcb    c.cr
0017 2F52302F         newexe    fcc    "/R0/"
001B 434D4453         cmds      fcc    /CMDS/
001F 0D                         fcb    c.cr
0020 5368656C         shell     fcc    /Shell/
0025 0D                         fcb    c.cr
0026 53746172         startup   fcc    /Startup -p/
0030 0D                         fcb    c.cr

0031 55007412         initdat   fcb    $55,0,$74,$12
0035 7FFF03B7                   fcb    $7F,$FF,$03,$B7
0039 FFDF7EF0                   fcb    $FF,$DF,$7E,$F0
003D 0C                         fcb    $0C

000D                  idatlen   equ    *-initdat

003E 308C55           Start     leax   <rti,pcr
0041 103F09                     os9    f$icpt
0044 308CEA                     leax   <initdat,pcr
0047 CE0071                     ldu    #$0071
004A C60D                       ldb    #idatlen
004C A680             movidat   lda,x+,pcrt,$F0,pcr
004E A7C0                       sta    ,u+
0050 5A                         decb
0051 26F9                       bne    movidat
```

```
0053 308CC5              leax  <cmds,pcr
0056 8604                lda   #4
0058 103F86              os9   i$chgdir
005B 308CC2              leax  <shell,pcr
005E 338CC5              leau  <startup,pcr
0061 CC0100              ldd   #$0100
0064 108E0015            ldy   #21
0068 103F03              os9   f$fork
006B 2527                bcs   infloop
006D 103F04              os9   f$wait
0070 308CA0              leax  <newdir,pcr
0073 8603                lda   #3
0075 103F86              os9   i$chgdir
0078 308C9C              leax  <newexe,pcr
007B 8604                lda   #4
007D 103F86              os9   i$chgdir
0080 308C9D     restart  leax  <shell,pcr
0083 CC0100              ldd   #$0100
0086 108E0000            ldy   #$0000
008A 103F03              os9   f$fork
008D 2505                bcs   infloop
008F 103F04              os9   f$wait
0092 24EC                bcc   restart
0094 20FE       infloop  bra   infloop
0096 3B         rti      rti
0097 E1ED78              emod
009A            eom      equ   *
00000 error(s)
00000 warning(s)
$009A 00154 program bytes generated
$0000 00000 data bytes allocated
$1948 06472 bytes used for symbols
```

Listing 2: `cls`

```
               * Clear Screen Utility
               * by David Curtis / Heath, OH
               * To use cls load cls; link cls  and
               * type cls anytime you want to clear the screen


                                  nam   cls
                                  ifpl
                                  endc

  0000 87CD0028                   mod   endpgm,name,type,revs,start,size

  000D 636CF3          name       fcs   /cls/
  0011                 type       set   prgrm+objct
  0081                 revs       set   reent+1
D 0000                 char       rmb   1
  0010                 size       equ   *

  0010 5F              start      clrb
  0011 860C                       lda   #$0C
```

```
00022   0013 308DFFE9            leax  char,pcr
00023   0017 A784                sta   0,x
00024   0019 108E0001            ldy   #$01
00025   001D 8601                lda   #$01
00026   001F 103F8A              os9   i$write
00027   0022 103F06              os9   f$exit
00028   0025 C33547              emod
00029   0028            endpgm   equ   *
00030                            end

00000 error(s)
00000 warning(s)
$0028 00040 program bytes generated
$0001 00001 data bytes allocated
$18D0 06352 bytes used for symbols
```

Listing 3: `alternat.cls`

```
00001       * Alternative version of CLS that forks a process
00002       * to use the DISPLAY utility to clear your screen.
00003
00004                            nam   cls
00005                            ifpl
00007                            endc
00008
00009   0000 87CD003E            mod   clsend,name,type,revs,start,size
00010   000D 636CF3     name     fcs   /cls/
00011   0010 02         edition  fcb   2
00012   0011            type     set   prgrm+objct
00013   0081            revs     set   reent+1
00014 D 0000                     rmb   300
00015 D 012C            size     equ   .
00016
00017   0011 7368656C   shlstr   fcs   /shell/
00018   0016 64697370   cmdstr   fcc   /display 0C/
00019   0020 0D                  fcb   $0D
00020
00021   0021 308DFFEC   Start    leax  shlstr,pcr
00022   0025 338DFFED            leau  cmdstr,pcr
00023   0029 108E000A            ldy   #$0A
00024   002D 8601                lda   #1
00025   002F 5F                  clrb
00026   0030 103F03              os9   f$fork
00027   0033 2503                bcs   error
00028   0035 103F04              os9   f$wait
00029   0038 103F06     error    os9   f$exit
00030   003B EA7E5C              emod
00031   003E            clsend   equ   *
00032                            end

00000 error(s)
00000 warning(s)
$003E 00062 program bytes generated
$012C 00300 data bytes allocated
$18FD 06397 bytes used for symbols
```

THESE FINE STORES CARRY THE RAINBOW

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

ALABAMA	
Birmingham	Jefferson News Co.
Brewton	McDowell Electronics
Florence	Anderson News Co.
Greenville	M & B Electronics
Madison	Madison Books
Montgomery	Trade 'N' Books
ALASKA	
Fairbanks	Electronic World
ARIZONA	
Phoenix	TRI-TEK Computers
Sierra Vista	Livingston's Books
Tempe	Books Etc.
	Computer Library
Tucson	Anderson News Co.
ARKANSAS	
Fayetteville	Vaughn Electronics/Radio Shack
Little Rock	Anderson News Co.
CALIFORNIA	
Citrus Heights	Software Plus
Grass Valley	Advance Radio, Inc.
Half Moon Bay	Strawflower Electronics
Hollywood	Levity Distributors
	World Book & News Co.
Lompoc	L&H Electronics Emporium
Los Angeles	E.D.C. Industries
	Polygon Co.
Sacramento	Tower Magazine
Santa Rosa	Sawyer's News, Inc.
Sunnyvale	Computer Literacy
COLORADO	
Westminster	Software City
DELAWARE	
Middletown	Delmar Co.
Milford	Milford News Stand
Wilmington	Normar, Inc.—The Smoke Shop
FLORIDA	
Boca Raton	Software, Software, Inc.
Cocoa	The Open Door
Davie	Software Plus More
Ft. Lauderdale	Electronics Engineers
	Mike's Electronics Distributor
Jacksonville	The Book Nook
	Book Town
	Deano's TV
Melbourne	City Newsstand
	The Little Store
North Miami Beach	Almar Bookstore
Orlando	Book Mania
Panama City	Boyd-Ebert Corp.
Pensacola	Anderson News Co.
Pinellas Park	Wolf's Newsstand
Sarasota	Family Computers
Starke	Record Junction, Inc.
	Radio Shack Dealer
Sunrise	Sunny's at Sunset, Inc.
Tallahassee	Anderson News Co.
Tampa	Fine Print Bookstore
	Sound Trader & Computer Center
Titusville	Computrac
GEORGIA	
Bremen	Bremen Electronics/Radio Shack
Cummings	Kent Radio Shack
Jesup	Radio Shack
Marietta	Act One Video
Toccoa	Martin Music Radio Shack
IDAHO	
Moscow	Johnson News Agency
ILLINOIS	
Aurora	Kroch's & Brentano's
Belleville	Software or Systems
Champaign	Book Market
Chicago	B. Dalton Booksellers
	N. Wabash St.
	West Jackson St.
	Bob's in Newtown
	Bob's News Emporium
	Bob's Rogers Park
	Book Market
	East Cedar
	North Cicero
	West Diversey
	E.B. Garcia & Associates
	Kroch's & Brentano's
	South Wabash
	West Jackson
	516 N. Michigan
	835 N. Michigan
	Parkway Drugs
	Parkwest Books
	Sandmeyer's Bookstore
	Univ. of Chicago Bookstore
	Univ. of Illinois Bookstore
	Videomat, Inc.
Chillicothe	Book Emporium
Danville	Book Market
Decatur	Book Emporium
	K-Mart Plaza
	Northgate Mall
East Moline	Book Emporium
Evanston	Chicago-Main News
Geneseo	B & J Supply
Kewanee	Book Emporium
Lisle	Book Nook
Newton	Bill's TV Radio Shack
Oak Brook	Kroch's & Brentano's
Oak Park	Kroch's & Brentano's
Paris	Book Emporium
Peoria	Book Emporium
	Sheridan Village
	Westlake Shopping Center
	Book Market
	Illinois News Service
Schaumberg	Kroch's & Brentano's
Skokie	Kroch's & Brentano's
Springfield	Book Emporium
	Sangamon Center North
	Town & Country Shopping Ctr.
Sunnyland	Book Emporium
West Frankfort	Paper Place
Wheeling	North Shore Distributors
INDIANA	
Berne	White Cottage Electronics
Columbus	Micro Computer Systems, Inc.
Garrett	Finn News Agency, Inc.
Greenwood	The Computer Experience
Indianapolis	Bookland, Inc.
	Delmar News
	Indiana News
Jasper	Elex Mart
Madison	Arco Office Supplies
Martinsville	Radio Shack
Wabash	Mitting's Electronics
IOWA	
Davenport	Interstate Book Store
KANSAS	
Topeka	Palmer News, Inc.
	Town Crier of Topeka, Inc.
Wichita	Amateur Radio Equipment Co.
	Lloyd's Radio
KENTUCKY	
Georgetown	Goodwin Electronics
Hazard	Daniel Boone Gulf Mart
Hopkinsville	Hobby Shop
Louisville	The Computer Store
Paducah	Radio Shack
Paintsville	R-Kat Electronics
Pikeville	Gus-Stan Enterprises
Princeton	Miller Electronics
LOUISIANA	
Crowley	Acadiana Newsstand
Monroe	The Book Rack
MAINE	
Brockton	Voyager Bookstore
Caribou	Radio Shack
Waterboro	Radio Shack
MARYLAND	
Silver Spring	Layhill Newsstand
MASSACHUSETTS	
Brockton	Voyager Bookstore
Cambridge	Out Of Town News
Fitchburg	Corners Book Shop
Ipswich	Ipswich News
Littleton	Computer Plus
Lynn	North Shore News Co.
MICHIGAN	
Allen Park	Book Nook, Inc.
Dearborn	DSL Computer Products
Durand	Robbins Electronics
Harrison	Harrison Radio Shack
Lowell	Curt's Sound & Home Arcade Center
Mt. Clemens	Key Book Shop
	Michigan Radio
Muskegon	The Eight Bit Corner
Owosso	C/C Computer Systems
Perry	Perry Computers
	Perry Oil & Gas
Roseville	New Horizons
Royal Oak	Software City
St. Johns	Clinton Electronics
Sterling Heights	Sterling Book Center
Wyoming	Gerry's Book Co.
MINNESOTA	
Minneapolis	Read-More News
Willmar	The Photo Shop
MISSOURI	
Farmington	Ray's TV & Radio Shack
Jefferson City	Cowley Distributing
Kirksville	T&R Electronics
Moberly	Audio Hut
St. Louis	Book Emporium
	Computer Xchange
University City	Final Edition
MONTANA	
Whitefish	Consumer Electronics of Whitefish
NEBRASKA	
Lincoln	Hobby Town
Omaha	Computers & Components
NEVADA	
Las Vegas	Hurley Electronics
NEW HAMPSHIRE	
West Lebanon	Verham News Corp.
NEW JERSEY	
Cedar Knolls	Village Computer & Software
Clinton	Micro World II
Lawrenceville	Micro Con Software Center
Linwood	Software City
Marmora	Outpost Radio Shack
Montvale	Software City
Pennsville	Dave's Elect. Radio Shack
River Edge	Software City
Rockaway	Software Station
NEW MEXICO	
Alamogordo	New Horizons Computer Systems
Albuquerque	Desert Moon Distributors
	Page One Newsstand
NEW YORK	
Brockport	Lift Bridge Book Shop, Inc.
Elmira Heights	Southern Tier News Co., Inc.
Fredonia	On Line: Computer Access Center
Hudson Falls	G.A. West & Co.
Johnson City	Unicorn Electronics
New York	Barnes & Noble—Sales Annex
	Coliseum Books
	Eastern Newsstand
	Grand Central Station, Track 37
	200 Park Ave., (Pan Am #1)
	55 Water Street
	World Trade Center #2
	First Stop News
	Idle Hours Bookstore
	International Smoke Shop

	Jonil Smoke
	Penn Book
	Software City
	State News
	Usercom Systems, Inc.
	Walden Books
	World Wide Media Services
N. White Plains	Software City
Pawling	Universal Computer Service
Rochester	Village Green
	World Wide News
Woodhaven	Spectrum Projects
NORTH CAROLINA	
Aberdeen	King Electronics
	Radio Shack
Cary	News Center in Cary Village
Charlotte	Newsstand Int'l
	Papers & Paperback
Havlock	Computer Plus
Hickory	C^2 Books & Comics
Marion	Boomers Rhythm Center
NORTH DAKOTA	
Fargo	Computer Associates
OHIO	
Blanchester	JR Computer Control
Canton	Little Professor Book Center
Chardon	Thrasher Radio & TV
Cincinnati	Cinsoft
Columbiana	Fidelity Sound & Electronics
Coshocton	Utopia Software
Dayton	Huber Heights Book & Card
	Wilke News
Fairborn	News-Readers
Girard	Girard Book & News
Kent	The News Shop
Kenton	T.W. Hogan & Associates
Lakewood	Lakewood International News
Lima	Brunner News Agency
	Edu-Caterers
Miamisburg	Wilke News
Mount Orab	Mount Orab Radio Shack
Rocky River	Programs Unlimited
Toledo	Leo's Book & Wine Shop
Xenia	Fine Print Books
OKLAHOMA	
Oklahoma City	Merit Micro Software
Tulsa	Steve's Book Store
OREGON	
Portland	Fifth Ave. News
PENNSYLVANIA	
Allison Park	Software City
Altoona	Newborn Enterprises
Brookville	Larry's Stereo Shop
Malvern	Personal Software
Philadelphia	City Software Center
	Newsy
Phoenixville	Stevens Radio Shack
Pittsburgh	All-Pro Souveniers
Pleasant Hills	Pitt Computer & Software
Temple	Software Corner
Wind Gap	Micro World
York	The Computer Center of York
RHODE ISLAND	
Warwick	Software Connection
SOUTH CAROLINA	
Charleston Hts.	Software Haus, Inc.
Gaffney	Gaffney Book Store
Greenville	Palmetto News Co.
Spartanburg	Software City
Union	Fleming's Electronics
TENNESSEE	
Chattanooga	Anderson News Co.
	Guild Books & Periodicals
Dickson	Highland Electronics

Knoxville	Anderson News Co.
	First Byte Computer Co.
Memphis	Computer Center
	Software, Inc.
Nashville	Mosko's Book Store
Smyrna	Delker Electronics
Union City	Cox Electronics Radio Shack
TEXAS	
Elgin	The Homing Pigeon
Orange	Northway Books & News
San Antonio	CoCo Nuts
UTAH	
Murray	Deseret Book
VIRGINIA	
Gafton	Electronics Marketing
Norfolk	I-O Computers
Richmond	Software City
WASHINGTON	
Seattle	Adams News Co., Inc.
Tacoma	B & I Magazines & Books
	Nybbles 'N Bytes
WEST VIRGINIA	
Huntington	Nick's News
Logan	Stan's Electronics & Radio Shack
Madison	Communications, LTD
Parkersburg	Valley News Service
WISCONSIN	
Appleton	Badger Periodicals
Cudahy	Cudahy News & Hobby
Ladysmith	Electronics, Etc.
Milwaukee	Book Tree
	Booked Solid
	Booked Solid II
	Harvey Schwartz Bookshop
	Univ. of Wisconsin Bookshop
WYOMING	
Casper	The Computer Store
ARGENTINA	
Cordoba	Informatica Y Telecomunicaciones
AUSTRALIA:	
Kingsford	Paris Radio Electronics
CANADA:	
ALBERTA	
Banff	Banff Radio Shack
Blairmore	L & K Sports & Music
Bonnyville	Paul Tercier
Brooks	Double "D" A.S.C. Radio Shack
Calgary	Billy's News
Claresholm	Radio Shack Associated Stores
Drayton Valley	Langard Electronics
Edmonton	CMD Micro
	Kelly Software Distributors
Edson	Radio Shack
Fairview	D.N.R. Furniture & TV
Fox Creek	Fox City Color & Sound
	A.S.C. Radio Shack
Ft. Saskatchewan	Ft. Mall Radio Shack, ASC
Grande Cache	The Stereo Hut
Grande Centre	The Book Nook
Hinton	Jim Cooper
Innisfail	L & S Stereo
Leduc	Radio Shack Associated Stores
Lethbridge	Datatron
Lloydminster	Lloyd Radio Shack
Okotoks	Okotoks Radio Shack
Peace River	Radio Shack Associated Stores
	Tavener Software
St. Paul	Walter's Electronics
Stettler	Stettler Radio Shack
Strathmore	Wheatland Electronics
Taber	Pynewood Sight & Sound

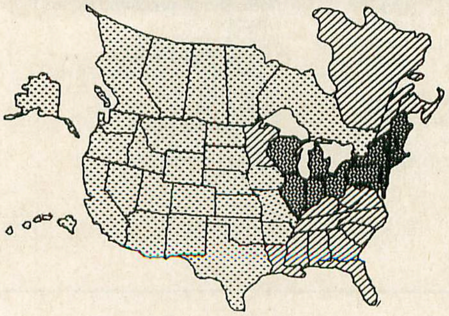
Westlock	Westlock Stereo
Wetaskiwin	Radio Shack
BRITISH COLUMBIA	
Burnaby	Compulit
Burns Lake	VT. Video Works
Campbell River	TRS Electronics
Chilliwack	Charles Parker
Coortenay	Rick's Music & Stereo
Dawson Creek	Bell Radio & TV
Golden	Taks Home Furnishings
Langley	Langley Radio Shack
N. Vancouver	Microwest Distributors
Nelson	Oliver's Books
Parksville	Parksville TV
Penticton	D.J.'s
	Four Corner Grocery
Salmon Arm	Matrix Computing
Sidney	Sidney Electronics
Smithers	Wall's Home Furniture
100 Mile House	Tip Top Radio & TV
MANITOBA	
Altona	L.A. Wiebr Ltd.
Lundar	Goranson Elec.
Morden	Central Sound
The Pas	Jodi's Sight & Sound
Selkirk	G.L. Enns Elec.
Virden	Archer Enterprises
Winnipeg	J & J Electronics Ltd.
NEW BRUNSWICK	
Moncton	Jeffries Enterprises
Sussex	Dewitt Elec.
NEWFOUNDLAND	
Botwood	Seaport Elec.
Carbonear	Slade Realties
NOVA SCOTIA	
Halifax	Atlantic News
ONTARIO	
Aurora	Compu Vision
Concord	Ingram Software
Exceter	J. Macleane & Sons
Hamilton	Dataman
Hanover	Modern Appliance Centre
Huntsville	Huntsville Elec.
Kenora	Donny "B"
Kingston	T.M. Computers
Listowel	Modern Appliance Centre
South River	Max TV
	Dennis TV
QUEBEC	
LaSalle	Messageries de Presse Benjamin Enr.
Pont. Rouge	Boutique Bruno Laroche
SASKATCHEWAN	
Assiniboia	Telstar News
Estevan	Kotyk Electronics
Moose Jaw	D&S Computer Place
Nipiwan	Cornerstone Sound
Regina	Regina CoCo Club
	Software Supermarket
Saskatoon	Everybody's Software Library
Shellbrooke	Gec. Laberge Radio Shack
Tisdale	Paul's Service
Unity	Grant's House of Sound
YUKON	
Whitehorse	H & O Holdings
JAPAN	
Tokyo	America Ado, Inc.
PUERTO RICO	
San Juan	Software City

Also available at all B. Dalton Booksellers, and selected Coles Bookstores, Waldenbooks, Pickwick Books, Encore Books, Barnes & Noble, Little Professors, Tower Book & Records, Kroch's & Brentano's, and Community Newscenters.

ADVERTISER'S INDEX

We encourage you to patronize our advertisers — all of whom support the Tandy Color Computer. We will appreciate your mentioning **THE RAINBOW** when you contact these firms.

After Five Software 72
Ark Royal Games 13
Canyon County Devices 112
Cer-Comp 194, 195
Challenger. 144
Cinsoft 97
CNR Engineering. 150
CoCo Trend 143
Cognitec .137
Colorware. 21, 22, 23
CompuServe 99
Computer Center 35
Computer Island 171
Computer Plus 3
Computerware 39, 41
Computize, Inc. 146, 209
Crockett Software 84
D & A Research 187
Dayton Associates of
W. R. Hall, Inc. 128
Delphi Bureau 122, 123
Derringer Software. 76, 77
Diecom. .IFC
Disto 65
Dorsett. . . . . .IBC
Duck Productions 140
Federal Hill Software 162
Group Technology 82
Hard Drive Specialists 165
Hawkes Research Services 162
HJL div. of Touchstone
Technology, Inc. 116
Hogg, Frank Laboratories 189
Howard Medical 34, 210
J & M Systems . . . . .BC
J & R Electronics 139
Johnson, D.P. 198
Kelly Software Distributors 161
Mark Data Products 69
Metric Industries. 85, 133
MicroSmart, Inc. 100, 101
Micro Works, The 176
Microcom Software 16, 17
Microtech Consultants Inc. 31
MicroWorld 181
Mix, Tom Software 184
Moreton Bay 95
Novasoft 185
Other Guys Software, The 113
Owl-Ware 89, 90, 91
PCM 130
Perry Computers 167
Plan-Net Forms 134
Polygon 75
Preble's Programs, Dr. 11
Prickly-Pear Software. 157
PXE Computing 7
Radio Shack 49, 51
Rainbow OS-9 Book. 124
Rainbow Binder 202
Rainbow Bookshelf 179
Rainbow Gift Subscription 66
Rainbow On Disk 159
Rainbow On Tape 172
Robotic Microsystems 138
Rowe Electronic Co., Inc. 144
S.D. Roberson 187
Saguaro Software 147
SECA. 73
Selected Software 37
Software House, The 135
Spectrogram 141
Spectrosystems 145
Spectrum Projects Inc.
. . . .105, 106, 107, 109, 110, 111
Speech Systems
. . . . .56, 57, 58, 59, 60, 61
Sugar Software. 79
Sunrise Software 142
T & D Software 201
TCE 14
Tepco 68
Thinking Software, Inc. 24
Tothian Software Inc. 83
True Data Products 152, 153
Wasatchware 181
Woodstown Electronics 143
York 10 .149
Zebra Systems 20



▒ **Call:**
Shackleford, Nolan, Davis, Gregg and Associates
Cindy Shackleford, president
Shirley Duranseau
Advertising Representative
12110 Meridian South, Suite 5
P.O. Box 73-578
Puyallup, WA 98373-0578
(206) 848-7766

▨ **Call:**
Kim Vincent
Advertising Representative
The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
(502) 228-4492

■ **Call:**
Jack Garland
Garland Associates, Inc.
10 Industrial Park Road
Hingham, MA 02043
(617) 749-5852

ALL SOFTWARE
COMPATIBLE
WITH
COCO I & COCO II
COMPUTERS

Computize INC

(215) 946-7260 P.O. BOX 207 • LANGHORNE, PA 19047

VISA MasterCard

Check or M.O. • Add $3.00 shipping • PA residents add 6% sales tax

★ ★ ★ ★ ★ ★ ★ THE LATEST IN COCO NEWS!!! ★ ★ ★ ★ ★ ★ ★

OUR
GRAPHICOM
DIGITIZER
JUST GOT BETTER
SEE PAGE 146

SUPER BACK-UP UTILITY©

...WITH S.B.U. FROM COMPUTIZE — YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!!
SUPER BACK-UP UTILITY WILL PERFORM **ALL** OF THE FOLLOWING FUNCTIONS:

1. **TAPE TO TAPE** (Regardless of most protection schemes!)
2. **TAPE TO DISK** (Move Cassette programs to Disk!)
3. **AUTO RELOCATE** (For those Cassette programs that conflict with Disk operating systems.)
4. **DISK TO TAPE** (Place Disk programs onto Cassette)
5. **DISK TO DISK** (Our powerful Split-N-Image Program, Copies regardless of most protection schemes!)

- **MENU DRIVEN**
- **REQUIRES 32K EXTENDED COCO**
- **REQUIRES 1 OR 2 DRIVES**
- **ALL MACHINE LANGUAGE!!!**

COMPARE WITH OTHER INDIVIDUAL PROGRAMS COSTING IN EXCESS OF 100.00

DISK $49.95 .... Cat. No. 107CD

SPIT-N-IMAGE©
M/L Disk Back-Up Utility

There is no need to suffer the heartbreak of rashed disks any longer. Spit-N-Image will reate a mirror image of your valuable disk programs which do not respond to normal back-up unctions. Will also initialize and back-up in one ass. Data processing experts always insist on aving a back-up — it's good practice.

REQUIRES 32K CC

ISK $34.95 .... Cat. No. 101CD

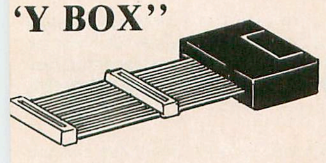
TRIPLE TRANSFER UTILITY©

ransfer contents of disk to tape • Transfer conents of tape to disk • Automatically relocates assette programs that conflict with the disk perating system • Displays machine language rogram addresses • Copies ASCII, Basic, & lachine Language Programs • All contained in menu driven program!

REQUIRES 32K CC EXT.

isk $24.95 .... Cat. No. 105CD

'Y BOX''



you have ever owned a **"Y" Cable** you know w easy it is to 'bump' or dislodge the cable om the computer. With the positive mechanical nnection of the **"Y Box"** chances are greatly duced of the "Y" coming dislodged.

ne of the most common causes of a shorted ta bus in the CoCo is a misaligned or loose Y" **Cable.** Don't let your computer be the next tim of a **"Y" Cable.** order the **"Y Box"** from MPUTIZE.

NOISE FREE **"GOLD CONTACT"** TO YOUR COMPUTER
POSITIVE **MECHANICAL** AND **ELECTRICAL** CONNECTION

Catalog No. 162CH Only **$29.95**

MASTER KEY II

w Improved Version! A hardware product that kes control of any program regardless of protecn. Now use with RS Multi-pak, "Y" cable or **tional** extender cable. Captures register contants they were when Master Key II was engaged. mplete disassembler, memory save, and much re. Requires some familiarity with Assembly nguage.

M PAK Cat. No. 160HR .... $ 99.95
. No. 161HR With Ext. Cable $109.95

QUICK BACKUP UTILITY $19.95

NEW

Catalog No. 185CD

Deluxe backup utility for the Radio Shack Color Computer.

- Backup a disk in as few as 32 seconds (in three passes)
- Format and backup a full disk in one minute
- Full error correcting features (retry, skip, infinite retry)

Displays the current track that is being processed, works with all ROM versions. Supports 1 or 2 disk drive. A great disk production tool.

GRAPHICOM $24.95

Catalog No. 111GD
Simply stated - One of the finest graphic programs written for the Color Computer!
FEATURES:

- S-U-P-E-R U-S-E-R F-R-I-E-N-D-L-Y !
- Supports 4 Hi-Res display modes
- 4 page animation mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
- Multiple Hi-Res character fonts (user redefinable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
- SEND/RECEIVE slow-scan television
- Many additional features, operating hints, hardware mod's and suggestions, etc.

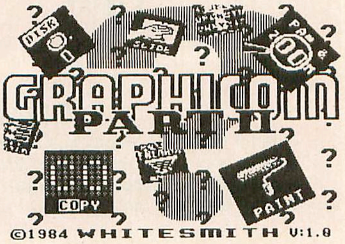
REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS

NEW
ERROR
CONTROL
COUPLING

Announcing COLORSCAN, new software for the CGP-220. This program is a must for anyone who owns a Radio Shack Ink Jet Printer, and enjoys creating graphics with Graphicom, Graphicom Part II, CoCo MAX, or any program that produces a standard 6K binnary picture files.
This program contains some of the popular features found in "HARDCOPY" such as 1x1, 2x2 and posters; but color scan produce full color printouts of your favorite 6K graphics files. You can also create colorful banners up to 27' in length, or dump a disk's entire graphic contents to paper.
Colorscan will print program listings in blazing color, make remarks in red, line numbers green, search for strings and print in blue, etc. All these features and more.
Colorscan catalog number 184WD $29.95

GRAPHICOM PART II
Catalog No. 132WD . $24.95

GRAPHICOM PART II DOES NOT REQUIRE GRAPHICOM TO RUN!



Graphicom Part II is a video processing package that provides many functions that are missing in Graphicom. Here are just a few of the features provided by Graphicom Part II:

ENLARGE/REDUCE/ROTATE
Enlarge or reduce any portion of a graphic screen, just like a photographic enlarger! Rotate by any degree or fraction of a degree around any point on the screen.

PAINT
Paint or "fill-in" any irregular area on the screen! More than 50 different colored patterns available. Additional paint patterns may be user-defined.

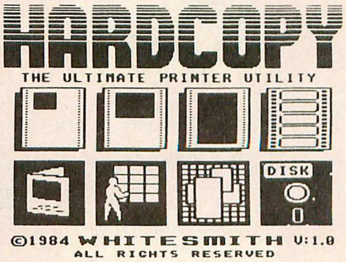
PAN & ZOOM
"Zoom in" x2, x4, or x8 on any portion of the screen to do fine pixel work. Allows editing of Graphicom character sets with ease!

TYPESETTER & FONT EDITOR
Add text in 16 different sizes, also supports user definable foreground & background colors. Design & Edit characters for use in the typesetter.

PIXEL BLASTER
Allows the user to easily substitute or remove colors. Widen lines, swap BLUE & RED without effecting BLACK & WHITE, etc.

Graphicom Part II requires a 64K extended disk basic system, and supports 1 to 4 disk drives, keyboard or joystick (analog or switch type) input. It will load and save both **Standard BIN** files and **Graphicom** screens. All functions support color or Hi-Res operation, as well as the 4 screen display modes.

ARE YOU LOOKING FOR A HI-RES GRAPHIC SCREEN PRINT PROGRAM?



HARDCOPY - Hardcopy is more than just a screen print utility, compare these features with any other graphic dump program on the market;

- Full GRAPHICOM/GRAPHICOM PART II compatibility! Loads STANDARD 6K images, GRAPHICOM pictures, and COCO MAX pictures too!
- BLACK & WHITE or GREY SCALE printing. In GREY SCALE printing, colors are printed as user definable patterns. Supports hi-res in all 4 GRAPHICOM display modes!
- **1x, 2x, 3x PRINTOUTS** - Three menu options are reserved for the most frequently used printout sizes; 1x (quarter page), 2x (half page), and 3x (full page).
- **GRAPHIC LABELS** - The label printing option allows the user to create custom mailing or disk labels with professional looking results.
- **GREETING CARDS** - The greeting card option allows the user to custom design greeting cards using both text and graphics.
- **GIANT POSTERS** - The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster.
- **SPECIAL EFFECTS** - The special effects option allows the user to directly control the printing directives; ROTATION, X/Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS/NEG IMAGE, and more!
- **USER CALL** - Have an application that **HARDCOPY** doesn't quite match? **HARDCOPY** routines can be added to EXTENDED BASIC through the USR command!

HARDCOPY* requires a 64K Color Computer or Color Computer II, and at least one disk drive.It supports 1 to 4 disk drives, keyboard or joystick input. Please specify **printer** and **cat. number** when ordering.
* Due to hardware differences, some features may function differently on certain printers.

IDS 480/560-G	Cat. No. 170WD
Oki 82A (Okigraph)	Cat. No. 179WD
Okidata 92	Cat. No. 171WD
Gemini 10X	Cat. No. 174WD
Gemini SG-10/15	Cat. No. 178WD
DMP-105	Cat. No. 183WD
Epson LX-80	Cat. No. 173WD
Epson MX-80	Cat. No. 172WD
Epson RX-80	Cat. No. 173WD
Epson FX-80	Cat. No. 173WD
Riteman PLUS	Cat. No. 177WD
DMP-110	Cat. No. 180WD
DMP-120	Cat. No. 176WD
DMP-130	Cat. No. 182WD
DMP-200	Cat. No. 175WD
CGP-220	Cat. No. 181WD

HARDCOPY PRINT UTILITY $29.95

Howard Medical Computers

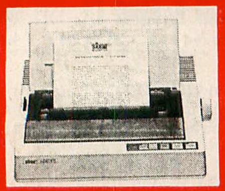
(800) 443-1444 ORDERS **(312) 278-1440** INQUIRIES AND ORDER STATUS

PRINTERS

NEW Dual Mode EPSON LX-80

The LX-80 offers draft or near letter quality plus a 1K input buffer for much faster graphics printing speed. LX-P package includes the LX-80, a Botek serial to parallel converter, and a Howard Printer Tutorial.

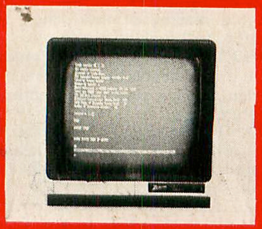
$317 **($7 shipping) Add $29.50 for tractor ET-1**



STAR NX-10

The NX-10 is the latest generation of printers and offers built-in back tractor feed giving forward and backward movement of paper plus exceptional graphics printing capabilities. NX-P package includes the NX-10, a Botek serial to parallel converter and the Howard Printer Tutorial. **$307** **($7 shipping)**

MONITORS



ZENITH 123A 12″

This 12″ green screen high resolution monitor offers 80 column capability, Zenith quality and a 30 day warranty valid at any of Zenith's 1200 locations.

REPACK

Retail $149 **Our price** **$67.50** **($7 shipping)**

122A Zenith 12″ Amber Screen offers the same 640 dots × 200 dots resolution at 15MHz as the 123A and a 90 day warranty valid at our 1200 locations. **($7 shipping)** **$88**

Closeout Specials — only 14 in stock. We have a limited number of lesser known color monitors that have been discontinued but are brand new in their original boxes. **$139** **($14 shipping)**

141 Roland 13″ Color Monitor with speaker, 270 dots × 200 dots resolution, 4 MHz band width. **$217** **($14 shipping)**

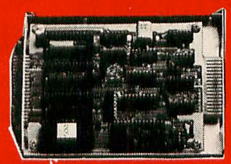
131 Zenith 13″ Color Monitor has medium resolution with speaker and RGB jack. **($14 shipping)** **$168**

All monitors require an amplifier circuit to drive the monitor and are mounted inside the color computer. They attach with spring connectors, with two wires extending out of the computer, one for audio and one for video.

VA-1 for monochrome monitors only, fits all color computers **($2 shpg)** **$24.45**

VC-4 for monochrome or color, fits all color computers **($2 shpg)** **$39.45**

DISK CONTROLLERS



DISTO

Includes controller and C-DOS ROM chip.

DC-3

$98 **($2 shipping)**

ADD-ON BOARDS

DC-38 includes 80 column capacity, parallel printer, real time clock, and all software **$138**

DC-256 256K RAM Board includes software to access all RAM **$125**

DC-3P Mini EPROM Programmer includes all software to program 2764 or 27128 **$55**

DC512 512K RAM Board **$165**

RS-1 Radio Shack's 1-1 ROM based operating system **$20**

DD-2 Double sided 360K disk drive with ½ height case and power supply **$188**

CA-1 Cable to connect controller to one drive **$24.50**

CA-2 Two drive cable **$29.50**

MEMORY

64-E1 for E Boards with complete instructions. Remove old chips and replace with preassembled package—no soldering or trace cuts. **($2 shpg)** **$28.45**

64-F1 for F Boards. No soldering needed. Capacitor leads must be cut. **$24.45** **($2 shipping)**

64-2 for COCO 2. Kit requires one solder point, no trace cuts. **($2 shipping)** **$24.45**

64-22 Two chip set for 26-3134A and B, 26-3136A and B. Koren Color Computers require 1 solder point **$28.45** **($2 shipping)**

SOFTWARE SPECIALS

PAYROL/BAS™

Written in nonprotected basic for the color computer. This easy-to-use package of programs will simplify and decrease the time spent doing payroll. *Rainbow* May 1986 review says, "Elegant and professional." State and federal tables are already included. **Send for FREE 11 page reports guide.** **$79.95**

VIP LIBRARY

Softlaw's integrated package includes VIP writer terminal, data base, call and disk zap which can fix a diskette that is giving I/O errors. **$125**

SAP-II

Stock analysis program organizes your portfolio and gives specific sell and stop-loss points. **$19.95**

BPA-1

Chart your blood pressure from daily readings taken in the comfort of your home. **$19.95**

GUARANTEE

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back, (less shipping).

Howard Medical Computers 1690 N. Elston Chicago, IL 6062

ORDERS **(800) 443-1444**

INQUIRIES AND ORDER STATUS **(312) 278-1440**

Showroom Hours:
8:00-4:00 Mon.-Fri.
10:00-3:00 Sat.

WE ACCEPT: VISA • MASTERCARD • AMERICAN EXPRESS
C.O.D. OR CHECKS • SCHOOL P.O.'S

COMPUTER AIDED INSTRUCTION

Educational Programs for Students Grade K-12 and Adult Self Studies

NEW PROGRAMS FOR YOUR TANDY 1000 AND TRS-80 COLOR COMPUTER

Compatible with Apple - Atari - Commodore - TRS 80 I, III, 4 - IBM PC Jr.

32 Programs on Disk Available for TRS 80 Color Computer

• NEW! VIDEO CASSETTES FOR VHS!

InnerActive™ Video Tutorials

Complete with audio narration

4 cassettes with 8 programs in each of the following subject areas:

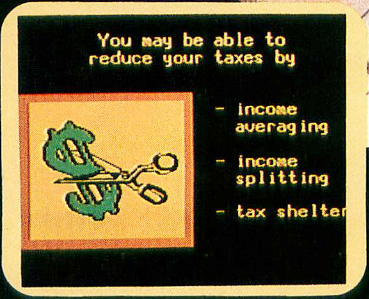
- **Basic Spanish Grammar**
- **Basic Algebra**
- **Reading by Phonics**
- **Basic Fractions**

$19.95 per/tape

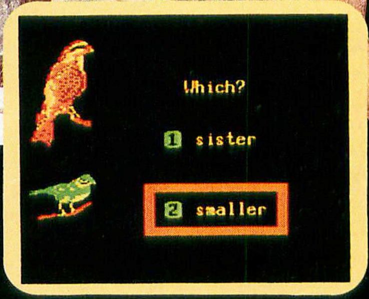
2 programs per tape. Running time: 45 minutes per tape.

16 Programs on 8 VHS Tapes $159.00

syllable adjectives
d in y usually just add
Which has one s ?
1

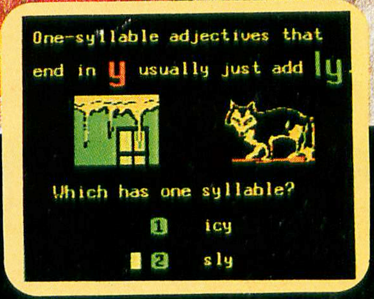

You may be able to reduce your taxes by

- income averaging
- income splitting
- tax shelter


Which?

1 sister

2 smaller


One-syllable adjectives that end in y usually just add ly.

Which has one syllable?

1 icy

2 sly

Interactive Tutorial Programs for Home or Classroom Use

Over 1000 programs for your selection with 32 now available on disk for the Color Computer and 500 now available for the Tandy 1000.

"We're Your Educational Software Source"

Subject	No. of Programs
Reading Development	256 (4 on disk)
Reading Comprehension	48 (4 on disk)
Mathematics	128
Algebra	16 (16 on disk)
History	32 (4 on disk)
Spelling	16
Government	16
Physics	16 (4 on disk)

16 Programs in each of the following:

Children's Tales - Carpentry - Electronics Health Services - Office Skills - Statistics First Aid/Safety - Economics - Business Accounting - Psychology - MUCH MORE!

Send for our free catalog of over 1000 Dorsett educational programs for Atari, TRS 80, Apple, IBM PC Jr., Commodore, Tandy 1000, etc.

Apple II, TRS 80 I, III, & 4, and Commodore 64 computers require respective conversion kits (plug-in board and stereo cassette player), **$99.00**. Atari 400/600/800/1200 computers require the Atari cassette recorder and the Dorsett 4001 Educational Master Cartridge, **$9.95**. For the IBM PC Jr. a cassette adapter cable and a good cassette recorder are required. The Tandy 1000 requires the Dorsett M1001 speaker/PC board kit, **$69.00**, and a standard cassette recorder. A Radio Shack CCR-81 or CCR-82 is recommended.

CASSETTES: $59.90 for an album containing a 16-program course (8 cassettes with 2 programs each); **$8.80** for a 2-program cassette.

DISKS: $14.95 for a one-program disk; **$28.95** for two disks; **$48.95** for four disks. All disks come in a vinyl album.

Dealer Inquiries Welcome

Dorsett Educational Software features:

- Interactive Learning
- User Friendly
- Multiple Choice and Typed
- Program Advance with Correct Response
- Full-time audio narration (Cassette Programs Only)
- Self-Paced Study
- High Resolution Graphics
- Easy Reading Text

For more information, or to order call:

TOLL FREE 1-800-654-3871
IN OKLAHOMA CALL (405) 288-2301

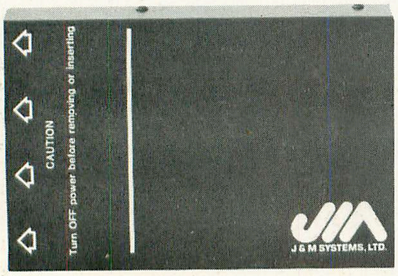
MasterCard VISA

DORSETT
Educational Systems, Inc.
Box 1226, Norman, OK 73070

LOWEST CONTROLLER PRICE EVER!

The New JFD-EC, Only $75

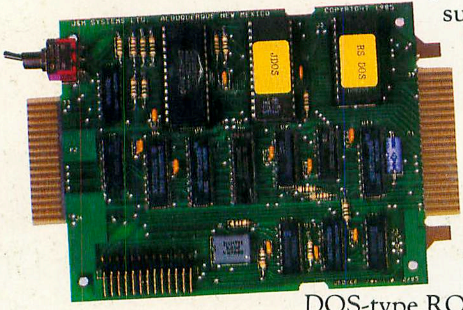
JFD-EC DISK CONTROLLER



The JFD-EConomical controller combines the best features of the original JFD-COCO with the two switchable ROM sockets, fully buffered data lines, and Memory Minder in ROM. The JFD-EC replaces the JFD-COCO in our product line at an even lower price. The controller includes JDOS, Memory Minder in ROM, and the JDOS manual.

JFD-EC Disk Controller with JDOS	$75

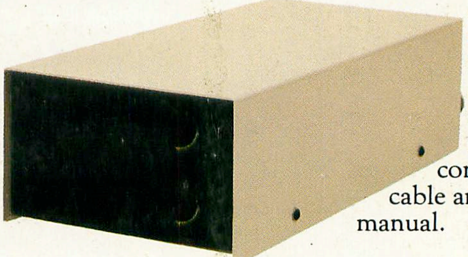
JFD-CP DISK CONTROLLER



Our new JFD-CP, compatible with both the orginal COCO and the COCO 2, features a parallel port to support a Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).

JFD-CP Disk Controller with JDOS	$139

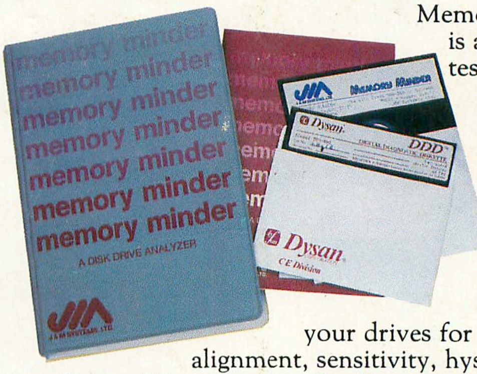
DRIVE SYSTEMS



Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2 operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.

Drive 0 System with one **double side drive**	$299
Drive 0, 1 System with two **double side drives**	$449

MEMORY MINDER**



Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

PRECISION ALIGNMENT DISKS (From Dysan)

PAD-40X1: Tests single side disk drives	$26
PAD-40X2: Tests double/single disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP or JFD-EC Controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package	$59
Memory Minder: single/double side package	$75

---

*OS/9 is a registered trademark of Microware, Inc.

**Memory Minder is a registered trademark of J&M Systems, Ltd.

NEW TERMS

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.

Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.

J & M SYSTEMS, LTD.

15100-A CENTRAL SE
ALBUQUERQUE, NEW MEXICO 87123
505/292-4182